The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XII. No. 293 · JANUARY 24, 1925 · Prepaid Annual Subscription: United Kingdom, £1.1.0; Abroad, £1.6.0.

Contents

PAGE

EDITORIAL: Chemistry and Civilisation; Dehydrated Tar v. Bitumen for Roads; An Important Du Pont Discovery; The Plant Difficulty Solved; Making Fabrics Moth-proof; Competition Ahead 69
Low Temperature Treatment of Bituminous Materials..... 72
The Message of Chemical Science to India—II..... 74
"Chemistry and Civilisation," by Sir Max Muspratt..... 76
Review of American Dyestuffs Industry 77
CORRESPONDENCE: Smokeless Fuel Experiments; The Facts About Plastic Wood; All-British Balances; A Mixed Ammonia Phosphate Fertiliser 79
Research Work at Birmingham University 80
Sulphur: A Colour Producing Element; Society of Dyers and Colourists 81
From Week to Week 83
References to Current Literature 84
Patent Literature 85
Market Reports 88
Company News; New Chemical Trade Marks; Tariff Changes; Chemical Trade Inquiries 93

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.*

Editorial and General Offices—8, *Bouverie St., London, E.C.4.*
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (6 lines)

Chemistry and Civilisation

As Mr. Woolcock rightly remarked, there are passages in the Hurter Memorial Lecture, delivered by Sir Max Muspratt on "Chemistry and Civilisation," which raise our conception of the services of chemical science to mankind completely out of the ordinary pedestrian economic ruts. While we cannot have too much science in the strictest technical sense, it is essential that the search for truth and the industrial application of its results should be leavened and saved from material exploitation by a steadfast regard for ideals, and a stirring message along these lines comes from a great industrial leader like this year's Hurter Lecturer with uncommon force. It is notable that so many minds to-day, searching for true lines of progress, should be turning back to Nature, and looking to such fields as bio-chemistry and radio-activity for the triumphs of the future. "Our best factory process," Sir Max declares, "does not compare in efficiency with Nature in a cornfield," and "the line of future chemical progress lies not only in copying but in wresting the secret processes of Nature from her." It is good to be reminded that civilisation cannot rest on material progress alone; that man is more important than industry; that the human factor must not be swallowed by the machine or civilisation is doomed. The Hurter Lecturer of last week recalls and repeats with a new accent and emphasis the fine plea by Lord Leverhulme in the Messel Lecture of last summer for that kind of higher vision without which people invariably perish; and very high among the sources of inspiration to all who have a feeling for these things must be the fact that such messages come from the greatest of our industrial statesmen.

Dehydrated Tar *v.* Bitumen for Roads

A QUESTION which is not infrequently asked to-day is—which is to be preferred, dehydrated tar or bitumen, for road making and surfacing? Inquiries elicit the fact that some surveyors and chemists place implicit faith in the properties of dehydrated tar; others assert that bitumen possesses outstanding merits; while a third and increasing group is inclined to favour a mixture of dehydrated tar and bitumen. If the inquiries are pursued further, it will be found that the evidence adduced by either section is not altogether convincing.

The making of a satisfactory road to-day involves the services of the surveyor and the chemist. The surveyor has an important duty to discharge. He is responsible, not only for the stability of the road foundations and for the construction of the road with proper materials which meet the necessary tests in respect of hardness and attrition, but with the aid of the chemist he has to select a product which will be insoluble in water, not susceptible to extremes of temperature, and yet possess distinct binding and waterproofing properties. The selection of such a product is not an easy matter, and obviously the surveyor looks to the chemist for reliable guidance and information in this connection.

The Ministry of Transport, about two years ago, issued a specification which provided that all tars for road purposes should pass a test for "consistency." But does consistency necessarily connote the property of binding, which, after all, is of major importance? It is true that a dehydrated tar of uniform consistency is better for the production of tar macadam and surfacing purposes than one lacking homogeneity, because efficient distribution, or spreading, is possible. But even so, a dehydrated tar of reasonably uniform consistency may not possess the requisite binding properties.

If one turns to bitumens, it will be found that those who advocate their use speak glibly about the "body" and "strength" possessed by these products. But these terms are far too vague and indefinite, and something more scientific is needed before a contrast of the two materials can be made. What is required is a test to measure the binding property of these materials. When such a test is devised, then a comparison of the respective merits of dehydrated tar and bitumen from at least one important aspect can be instituted. Meanwhile, it is believed that tests

already exist which allow of a contrast of the two products under discussion in respect of (*a*) insolubility in water, (*b*) susceptibility to extremes of temperature, and (*c*) waterproofing properties.

It is certain, however, that owing to the absence of uniformity in the qualities of crude tar a process merely consisting of dehydration will not give a product which will satisfy an exacting demand. So long as road tar is regarded as a by-product of the tar distiller, so long will bitumastic materials compete successfully. Gasworks and tar distillers, if they are to meet successfully the competition of bitumastic materials, must consider road tar as a primary product, and they must take steps to ensure that their material will meet all the requirements which are rightly demanded by those who are responsible for the construction of roads.

An Important Du Pont Discovery

THE important work which some few years ago was carried out by Bucher in connection with the use of finely-divided iron as a catalyst in the absorption of nitrogen by a hot mixture of sodium carbonate and coke for the preparation of sodium cyanide rekindled interest in a problem which has claimed the attention of technical chemists for nearly a hundred years. There have been many attempts to devise processes on a commercial scale whereby the absorption of nitrogen to form cyanides could be effected economically, and the method introduced by Bucher (who made use of briquettes containing sodium carbonate, coke, and iron as a catalyst) seemed at one time assured of definite success. Practical difficulties appear, however, to have supervened, for the reactivity of fused alkalis towards all materials capable of withstanding high temperatures, and other drawbacks associated with the removal of a partly fused mass of cyanide from furnaces, presented a chemical engineering problem of a particularly stubborn nature. Now, however, it appears from our American contemporary *Chemical and Metallurgical Engineering* that the chemical engineers of the well-known Du Pont company have, by a modification of plant and materials, succeeded in devising a process which has definitely proved successful, both from the practical and from the economic standpoints.

In order to follow out the salient features of the new method it may be well to recall that the production of sodium cyanide in this manner is represented by the following equation :—

$$Na_2CO_3+4C+N_2=2NaCN+3CO.$$

The Du Pont process was developed on the lines of heating a mixture of soda ash, carbon, and catalysts to approximately 975° C. in gas-fired retorts, with nitrogen passing through the mass under a pressure of 15 lb. per sq. in. The product from the retorts is leached with water to form a saturated cyanide solution, from which sodium cyanide is crystallised in pure form, the undissolved residue containing the catalysts being used to make up the next furnace charge and the mother liquor from the crystallising operation being used for further leaching. The cyanide crystals are dehydrated in hydraulic presses, which discharge the anhydrous cyanide in cakes of convenient form.

The Plant Difficulty Solved

IN experimenting with processes of the kind it has been customary to employ coke as the source of carbon, and in the earlier days of their investigation the Du Pont company used this material. Eventually, however, after several other forms of carbon had been investigated, attention was directed to the carbon which is produced as a by-product in the preparation of wood pulp for the manufacture of paper by the soda process. The introduction of this substance was followed by a substantial increase in the conversion of soda ash to cyanide, a considerably purer product, and a reduction by half of the time required for the completion of the reaction. The second important modification was the substitution of " black liquor " for commercial soda ash. This " black liquor " is also the product of the paper pulp manufacturer, being the liquid resulting from the evaporation of the caustic soda solution with which the wood is digested. The great advantage associated with the use of this liquor would seem to be that, after evaporation, etc., it consists of about 65 per cent. of soda ash, together with 35 per cent. of carbon. It is, therefore, not only entirely suitable as a source of soda ash, but in addition it largely fulfils the carbon requirements for the cyanising charge.

The problem of raw materials having been solved, there remained the troublesome question of plant construction and operation. One of the first decisions was to discard the " continuous feed " principle in favour of the " batch process," while a great deal of attention was given to the subject of retort protection, which eventually led to the development of an entirely new process for the production of heat and oxidation resistant castings, known as " chromium-coated castings." Such castings are made by coating the moulds with ferrochrome in such a manner as to form a high chrome-iron alloy on the outside surface of the iron or steel castings when the metal is poured. It has, fortunately, been found that there are several excellent oxidation-resisting materials available which can be used with complete success in the cyanide process. We have, of course, only been able to touch upon the more important developments which have led to this notable piece of work by the Du Pont undertaking. In many other details modifications have been introduced, all of which have contributed some essential quota to the final solution of the process. The whole is a piece of enterprise and pertinacity in which the Du Pont staff can justly take pride.

Making Fabrics Moth-proof

BY the time these lines are in print the London Section of the Society of Dyers and Colourists will have had submitted to it an interesting communication by Mr. J. Craft, B.Sc., on the incorporation of a chemical product named " Eulan " into woollen textiles and other fabrics, with a view to insuring for them permanent protection against damage by moths. This form of damage is one which penalises both the

business man and the private householder very heavily, and a process which makes fabrics inherently proof against attacks by moth should be welcomed as avoiding an immense wastage and destruction of material. The process has been developed by the well-known German firm of F. Bayer and Co., the producers of "Aspirin," and is the result of eight years of research and experiment. The firm claim to have discovered a means of treating furs, fabrics and similar materials in such a way as effectually to protect them against the ravages of the moth larvæ. The preparation, it is stated, has been severely tested, and if its claims are established and it comes into general use in the textile industry it may rank among the most important examples of the benefits of science applied to industry.

The Bayer firm, it may be recalled, have already given much attention to the "pickling" of seed, with the object of making them immune from diseases to which they are commonly subject, and of improving their fertility and growth. The present process, though not of course the same, represents the same kind of effort to provide protection against agents of destruction. Like many which have changed the course of industry the idea is simple. An eminent chemist to whom the subject was mentioned saw nothing inherently improbable in the process. He mentioned, for example, a simple preparation he had himself employed for removing mould on old prints. Dipped in this preparation the mould was not merely killed without damage to the print, but the material was found to be effectually inoculated against future attack. We give the information as to the new moth-proofing process very much as it reaches us, and shall hope to publish further particulars later.

Competition Ahead

THE interesting review, reproduced in this issue from a New York contemporary, of the American dyestuffs industry during the past ten years, brings out one interesting feature—the remarkable extent to which the British and the American industries, both in their difficulties and their successes, have proceeded on almost parallel lines. There was in each case a great wave of initial enthusiasm for setting up at any cost a national industry. Then came the inevitable disillusion; people who had rushed in were content to creep out. Next followed the genuine struggle, in many cases successful, on the part of the survivors to find a permanent foothold and to build up an industry capable of meeting, with a few exceptions, the demands of the country.

Among the problems the industry in America has to face is that of over-capitalisation; the importance, too, of sustained research is emphasised; the arts of advertisement also, which Germany so successfully employed, are not to be neglected. Perhaps the most practical point in the whole review is the frankness with which it is recognised that the real competitive period lies not behind, but ahead—competition both in home and in foreign markets. That, indeed, seems to be very much the position here, and we incline to the view that British producers will be found as well prepared for it as our American friends.

Points from Our News Pages

Dr. M. O. Forster's Presidential Address to the Indian Science Congress is concluded (p. 74).

Sir Max Muspratt dealt with the subject of "Chemistry and Civilisation" in the Hurter Lecture (p. 76).

Letters are published on—"The Facts about Plastic Wood" (J. C. Stamp); "All-British Balances" (M. Dunbar); "Smokeless Fuel Advertisements" (W. R. H.); "A Mixed Ammonia Phosphate Fertiliser" (E. Lloyd Pease). (p. 79)

Most-favoured-nation treatment is now accorded to goods of United Kingdom production or manufacture by the German Government (p. 79).

Papers read at the last meeting of the Manchester Section of the Society of Dyers and Colourists dealt with the S.R.A. Colours, and with the dyeing of acetyl silk (p. 81).

Our London market report reveals a distinct improvement, and export demand is better (p. 88).

Our Scottish market reports record no important changes but home and export inquiry is moderately good (p. 91).

A Birmingham chemist's claim in respect of a gas mask solution is reported (p. 94).

Books Received

A TREATISE ON PHYSICAL CHEMISTRY. Two Vols. Edited by Dr. Hugh S. Taylor. London: Macmillan and Co., Ltd. Pp. 1440. 50s.

AN INTRODUCTION TO THE LITERATURE OF CHEMISTRY. By F. A. Mason. London: Oxford University Press. Pp. 42. 2s.

BITUMINOUS SUBSTANCES. By Dr. P. E. Spielmann. London: Ernest Benn, Ltd. Pp. 206. 15s.

The Calendar

Jan. 26	Royal Society of Arts: Cantor Lecture (II.): "Radiological Research—A History." V. E. Pullen. 8 p.m.	John Street, Adelphi, London.
26–8	Royal Institute of Public Health: The Harben Lectures: "Phthisis and Industrialism (National and Occupational) with reference to other Infectious Diseases." Professor Edgar L. Collis. 4.30 p.m.	37, Russell Square, London.
27	Society of Chemical Industry (Birmingham Section): "The Utilisation of Waste Steam." A. J. Broughall. 7.15 p.m.	The University Buildings, Edmund St., Birmingham.
27	Northern Polytechnic Chemical Association: "Chemical Appointments." G. W. Marlow. 8 p.m.	Holloway.
28	Institution of Chemical Engineers: "Studies in Filtration." B. W. Clarke, S. G. M. Ure, J. W. Hinchley. 8 p.m.	Institution of Mechanical Engineers, London.
29	Scottish Oil, Paint and Varnish Trades Dinner.	Grosvenor Restaurant, Glasgow.
30	West Cumberland Society of Chemists and Engineers: "The Making of Leather." A. Purdie.	Workington.
31	West Yorkshire Metallurgical Society: Conjoint Meeting with the Institute of British Foundrymen (West Riding Branch): "Scrap Metals." G. Ledgard. 7.30 p.m.	Bradford.
31	Mining Institute of Scotland: Dinner. 5.45 p.m.	Grosvenor Restaurant, Gordon Street, Glasgow.
Feb. 2	Royal Society of Arts: Cantor Lecture (III): "Radiological Research—A History." V. E. Pullin. 8 p.m.	John Street, Adelphi, London.
2	Society of Chemical Industry (London Section): "The Constitution of Coal." Professor W. A. Bone. 8 p.m.	Burlington House, Piccadilly, London.
2	Institution of the Rubber Industry (London Section): "The Calendar in the Rubber Industry." W. G. Martin.	Engineers' Club, Coventry Street, London.
2	University of Birmingham Chemical Society: "The Genesis of Petroleum." S. W. Needham. 5.30 p.m.	Chemical Lecture Theatre, Edgbaston.

Low Temperature Treatment of Bituminous Materials

Chemical Engineering Conference in London

There was a useful discussion on "Low Temperature Treatment of Bituminous Materials" at a joint meeting of the Chemical Engineering Group and the London Section of the Society of Chemical Industry in the rooms of the Royal Society of Arts on Friday, January 16. Mr. C. S. Garland (Chairman of the Group) presided, and with him was Dr. Bernard Dyer (Chairman of the London Section).

THE discussion was introduced in a paper by MR. T. W. STAINER HUTCHINS, who laid down the following conditions as governing the satisfactory low temperature treatment of bituminous material:

1. To be successful plants for the low temperature treatment of bituminous material must obviously be profitable in application. It may be suggested that it is unnecessary to specify such an obvious condition, but reference to balance sheets prepared by enthusiastic inventors and others will show that the inclusion of this condition is warranted.

2. The flow of material during treatment should be continuous. A variation in this condition may be warranted in case (*a*) to the extent of an interrupted flow, providing the feed, treatment and discharge are mechanical and automatic.

3. The material during treatment should not vary more than a few degrees between the minimum and maximum temperatures at any point in the retort cross section.

4. The material during treatment should be subject only to a gradual and uniformly increasing temperature up to the maximum desired and then held at this temperature for the necessary period.

5. Oil vapours should be prevented from passing through the material under treatment.

6. Where the percentage of moisture in the material being treated is under 5 per cent., the design of the retort should permit the addition of water up to an amount to make the total equal to 5 per cent. or, alternatively, and in some cases preferably, the addition of steam and/or gases.

7. Where the water in the material to be treated is in excess of, say, 10 per cent. then drying of the material before heat treatment should be employed, as usually dryers are lower in capital cost and running costs than retorting plant.

8. The retort should be designed to treat both fines and large.

9. The retort should be designed to provide a large vapour releasing surface of the material during the heat treating period and agitation of the material during such period. This condition is obviously more important in case (*b*) than in case (*a*) (*v. ante*).

10. The design and construction of the furnace should be such that the control of temperature is easy, yet sudden fluctuations in temperature prevented.

11. The design and construction of the furnace should be such as to ensure a heating efficiency of at least 75 per cent.

12. The conditions above set out apparently limit, in practice, the design of the furnace or heating arrangement to external heating, and, where special conditions warrant, supplementary internal heating to a small extent.

13. Where internal heating only is employed and the products of the combustion of raw gases are carried into the retort direct for such heating, such gases must be diluted preferably with inert gases, as, otherwise, the initial temperature would be too great. If producer gas were used as the heating medium, the diluting gases would be approximately 50 per cent. on the resulting gas. This, in itself, would reduce the heating efficiency of such heating method by probably 25 per cent. below that of external heating.

14. Where the heating is obtained by gases circulated through the retort and then through recuperators or regenerators, the conditions set out in paragraphs 3 and 4 are not fulfilled, and the efficiency of such recuperators or regenerators must be taken into account in the calculation of the heat efficiency.

15. The use of superheated steam, unless the latent heat in such steam is recovered, not only does not fulfil the conditions set out in paragraphs 3 and 4, but brings the heating efficiency down almost to zero.

16. Where a retort is heated externally, the flow of the heating gases should be counter to the flow of the material under treatment. Where such method of heating is supplemented by internal heating, such internal heating should be uniflow with the material being treated.

17. Where the retort is heated internally, and heat efficiency is of importance, the flow of such heating gases should be contra to the flow of the material being treated.

18. The throughput of a particular size of retort on a given material will vary with the time given for treatment of such material. The retort, therefore, should be so designed that the particular heats required during treatment should be conveyed to the material in the minimum time, but experiments go to show that if oil—case (*b*) (above) is the important product, or is one of the important products, say, in case (*a*), the difference in temperature permissible between any particle of the material being treated and the heating medium at any moment (particularly at the higher temperatures) is limited to a figure in the neighbourhood of 50° C.

The direct application of molten lead as a heat carrying medium would not fulfil the conditions set out in paragraphs 3, 4, 11 and 18; also, there would be, in most cases, loss of lead due to a chemical combination between the ash and the molten lead, etc. The employment of lead for heating indirectly would necessitate complicated and expensive plant, and the lead heating furnace would, obviously, have but a low heat efficiency.

19. The charging valve and discharge valve for the retort are details, yet they, with other items, are important factors in the success, or failure, of the retort. Complicated, involved arrangements should be avoided. The moving parts of the feed (charging) valve and particularly the discharge valve should not come in contact with the stationary parts in the presence of the material. Yet in each case these valves must be so constructed as to assure a "seal" to prevent the inlet of air to the retort or escape of gas from the retort, and that such valve should be automatic.

20. The whole of the material, previous to treatment in the retort, should be crushed to a fine mesh, say the usual practice of $\frac{3}{8}$ in. and all under, thereby increasing the surface of the material being treated, and the throughput of the retort.

21. Where the retort is heated externally, or externally and internally, and preferably in all other cases, the inside of such retort should be kept free from scale. Internal mechanism, such as driven scrapers, paddles, worms, brushes, should be avoided, as whilst they would add to the throughput of the plant in the case of external or internal heating, yet they would quickly become blocked in cases where the material to be treated is of a caking or coking nature, and they would not prevent the growth of scale on the retort. When that scale grew to a thickness sufficient to permit the points of such scrapers, paddles, worms, or brushes, coming in contact with such scale, the consumption of power would go up, and finally result in breakage of, or damage to, such mechanism. There would also be a rapid decrease in heat efficiency with insufficient heat treatment of the material and a reduction in throughput. If the material being treated be of a non-caking or non-coking nature, the growth of scale would be slower, but it would, nevertheless, be at a sufficient rate to put the retort out of operation, for cleaning, etc., in the course of weeks.

22. Where the retort is employed for treating materials low in volatile matter, provision should be made for the removal of the resulting dust.

In the printed paper Mr. Hutchins stated that "all the points of design and/or operation above mentioned have been taken account of in the 'Fusion' retort," but in his opening remarks he admitted that this was rather too big a claim and should be modified. No one low temperature retort was capable of dealing with the whole of the conditions and requirements. The first and probably the main item of low temperature carbonisation was to produce a coke for domestic use, and that seemed to be the most popular, especially in London, not only for the consumer but also for the inventor and the promoter. The second aspect was to produce a retort to suit the conditions required for the recovery of oil or tar from the coal or other fuel, whilst a third aspect was total gasification. There were many others, and he did not claim that the "Fusion" retort covered the whole field. At the same time, he suggested that a period had

been reached when the question of low temperature carbonisation should no longer be shrouded in mystery.

Dr. Lander's Views

The CHAIRMAN in calling upon Dr. Lander, Director of the Fuel Research Board, to open the discussion, thanked him and his staff for the assistance given to the party which visited the Research Station at Greenwich during the afternoon, and suggested that as the party had had to be limited, it might be found possible to arrange other parties on other occasions.

Dr. LANDER said that there was still great interest in low temperature carbonisation, although the matter had been before the public for the past 20 years, and whilst the problem had been considered from the point of view of oil fuel supplies for the Navy, there was the very big field to be explored of the 35 million tons of coal now used in domestic grates. The Fuel Research Board had to look at the whole matter from the widest possible point of view. As the author had in effect said, the problem of smokeless fuel production by low temperature carbonisation in peace time depended absolutely upon whether the return for every £ put into a process was going to be 19s. 9½d. or 22s., and that was where the difficulty came in. He had no hesitation in saying that the first technical difficulties had been overcome, although there was room for very much more investigation because our knowledge of the whole subject was really very small. It was at present possible to produce a coke oil and a certain amount of gas by several processes, but when the question of £ s. d. was gone into difficulties were encountered. The merits of any particular process could only be judged in the light of full knowledge of the local conditions, such as the price of the coal used and the price it was likely to go to, because if a process were successful with a particular fuel the price of that fuel was bound to undergo a curious upward tendency which might result in the margin of profit disappearing altogether. One of the difficulties of the whole problem was that the raw material, if in the form of coal, was a direct competitor with the finished product of the process, although this did not not apply where a really waste material was being used.

His own opinion was that the author's plant was a very cheap and useful one and would play a very useful part in the particular field to which it was directed but there was still the problem of the solid fuel to be handled, if possible, without briquetting, and that was not a material which the author claimed to produce. On this latter aspect, they had reached the rather interesting stage that, with certain other processes, some large commercial experiments were being carried out—he hoped the promoters would not mind him calling them experiments—with plant of an adequate works size which it was known would produce the goods, and he could only hope that in, say, five years' time these experiments would show a profit to the promoters. In the press recently a certain foreign process had been boomed but in the process described in the paper they had a simple process which would do the same as the foreign process, at about half the cost.

The Maclaurin Process

He was interested in the author's remarks about heat adsorption because that problem had been encountered at the Fuel Research Station many years ago when, with the late Sir George Beilby, he examined the merits of the Maclaurin process. After making certain calculations they satisfied themselves that the Maclaurin process could not possibly work, because it seemed that the inventor would have to put in about 3 tons of steam for each ton of coal. Knowing Mr. Maclaurin, they wrote to him and he told them that he was doing it for about one-sixth that expenditure. When the matter was gone into again it was appreciated that they were dealing with an internally heated retort and the internally heated retort depended upon the degree of endo-thermicity, if he might use the term, being comparatively small. Experiments were now being very carefully made on the heat adsorbed, and the paucity of information on the subject shewed the difficulty of it. Finally, Dr. Lander said he appreciated the visit to the Research Station during the afternoon and would be pleased to show others everything there was to be seen there.

Mr. R. MACLAURIN said the paper set out 22 conditions which might be important for producing oil, but in his own case he was more concerned with producing a smokeless fuel and the point to be made clear to the high temperature man in order to bring him over to low temperature, was that he would get more out of a ton of coal by the low temperature process. It seemed to him that the Fusion process could only fill the bill in the case of certain fuels such as Esthonian shale or any shale that broke down into a pulp, but for Scottish shale it would be hopeless. Success with Scottish shale, which gave about 22 gallons of oil to the ton, depended upon the ammonia, and if the ammonia was neglected, as in the Fusion process, a considerable loss was entailed on the total working of the process. One of the things needed now was a process which would make a reasonable coke from small coal and he personally would welcome any such process, but it must beat the high temperature process by making a little more coke per ton of coal. With regard to the question of heat mentioned by Dr. Lander, he went into it and it seemed to be not a question of making calculations because the process was actually working. Theoretically the system involved passing 40,000 c. ft. of gas up to the plant in order to do the distillation and he had even arranged for pre-heating some of the gas, and therefore it was a surprise to him to find that he was able to carbonise the coal with as little as 13,000 c. ft. passing up through the plant. He could not explain it when the point was raised by the late Sir George Beilby and he was not sure that it had been properly explained now.

Dr. CULLEN said he had seen the author's retorts at work and could testify to their simplicity. At the same time, he was frankly disappointed that the paper dealt so little with the economic aspect of the subject.

Captain C. J. GOODWIN said he could hardly offer criticism of the paper as he had for some time been connected with the development of the Fusion retort. The high temperature carbonisation industry took about 20 years before it knew enough about its oils to make a profit out of them, and low temperature would probably have to go through the same process. During a long experience of briquetting, large sums of money had been lost in endeavouring to find new forms of binder, but he could say now that there would in the near future be upon the market a binder which would give a smokeless briquette at a cost for the binder of about 1s. per ton.

Mr. W. MACLAREN said it would rather appear from conditions Nos. 4 and 21 that the author had not been able to design a suitable mechanism which would do the work. He had recently been in Paris and had visited the installation near there of the Salerni process, and this had entirely solved the problem by means of an internal mechanism.

A Question of £ s. d.

Mr. CUNNINGHAM CRAIG agreed that the whole problem resolved itself into a question of £ s. d. It must first be decided whether oil was to be the main product because, then one type of process would have to be adopted, whilst another process was necessary if a solid fuel were required, and so on. Therefore, it was no use generalising about coals and shales and torbanites and considering them all as the same kind of thing. Those who had studied the subject scientifically were quite aware which was the best process to use in each particular part of the country and where the money could be made, if it could be made at all. From this knowledge of the Fusion retort he could say that in the actual making of oil it gave better results than any retort he knew.

Mr. JOHN ROBERTS pointed out that none of the conditions mentioned in the paper was essential to success in making a smokeless fuel. Absolutely the reverse of some of the conditions was necessary. The original problem was smokeless fuel, and that ought to be concentrated upon now and not so much attention paid to oil.

Mr. HUTCHINS briefly replying to the discussion, remarked that those who went to the Fuel Research Station had very much appreciated the manner in which everything was shown and how nothing was kept secret, and it was a satisfaction to know that there was such an institution where disinterested advice and information could be obtained by anyone who was asked to invest money in low temperature processes. He very much appreciated Mr. Cunningham Craig's remarks because he was such a difficult man to please, and when he expressed himself satisfied it must be taken that he had gone into the matter thoroughly.

Dr. BERNARD DYER proposed a hearty vote of thanks to the author. Mr. J. A. REAVELL, who seconded, said he knew the author had a lot more information he could have given but which he had to keep for other use. The vote was carried with acclamation.

The Message of Chemical Science to India.—(II)

By Dr. M. O. Forster, F.R.S.

We give below the concluding instalment of Dr. Forster's presidential address to the Indian Science Congress, in which he discusses the influence of science in the development of our Indian Empire, and hints at the possibility of vast advances in the fascinating field of bio-chemistry.

"The Good Old Times"

To the scientific representatives of a nation priding herself on freedom from materialism, and claiming for the East superiority over the West in attachment to things of the spirit, I pass with some trepidation from the ghostly allurements of scientific work to the more prosaic loaves and fishes. Occasionally in England you will encouter a fanatic who claims to long for "the good old times." On examination, you will find that he has never embarked on the slender research which suffices to reveal the disgusting details of the good old times. When I meet such a visionary I smugly tell him that if he likes to have recovered from small-pox, probably to be verminous, most certainly to be ignorant of the wonders which surround him and quite likely to be dead at forty, he is welcome to these advantages; for my part I prefer cleanliness, access to knowledge of Nature and a fair chance to complete the conventional span of life. Towards the end of his, Dr. Johnson said: "I am always angry when I hear the ancient times praised at the expense of modern times. There is now a great deal more learning in the world than there was formerly; for it is universally diffused. You have, perhaps no man who knows as much Greek and Latin as Bentley; no man who knows as much mathematics as Newton; but you have many more men who know Greek and Latin, and who know mathematics." This was in 1783, and the comments of the sage might be expected to have gained in force if they came to be uttered in 1925; because, while the opening sentence has continued to state the facts, he would have been able to amplify "learning" by toleration, sanitation and illumination—of body and mind. Concerning India, I am not yet sufficiently informed to say whether the ancient times were better than the present—so much depends on what one thinks one wants; but I do already know, to my satisfaction and gratitude, enough of this beautiful country to have seen that for men who try to be honest, cleanly, industrious and willing to believe good of their neighbours until the evidence forbids, the present is not such a bad time, after all. Another intellectual giant of the eighteenth century, probably wiser, certainly more experienced than Dr. Johnson, said on this matter: "So what signifies wishing and hoping for better times. We may make these times better if we bestir ourselves. Industry need not wish, and he that lives upon hope will die fasting."

Cui Bono?

Let us, therefore, with a stout heart, reply to the commendable citizen who seeks to know "what's the good?" of science, more particularly to India. Mechanical and civil engineering have provided India with a railway mileage approaching 40,000 and an irrigation acreage exceeding 28,000,000; both contribute incalculably to diminishing the disastrous consequences of seasonal failure. The same branches of science, allied with naval architecture, have brought Bombay actually within four weeks of New York, potentially within three weeks, and have enabled India to distribute £200,000,000 worth of goods throughout the world during one year. The domains of medicine and surgery, whose practitioners are ceaselessly and without ostentation combating the diseases to which tropical regions are more than others prone, owe their successful administration to advancement of knowledge in physiology and microbio-chemistry. Electrical technology has transformed into tangible values countless neglected foot-pounds formerly passing unheeded to the ocean: Sivasamudram alone, during the little more than twenty years of its active life, has made a total profit reaching 158 per cent. of the capital expended, and had a gross revenue-demand of Rs. 45 lakhs during 1923-24. The reflected value of such developments on the life of the nation cannot be measured. The stimulus to knowledge and manufacture is obvious, but the stimulus to India's greatest industry, agriculture, although less evident superficially, is more far-reaching, and might be greatly intensified. Two examples of what has been done will suffice to show what might be done. By cultivating improved strains and varieties, by war on parasites, by economic planting and by various other devices arising from the investigations of scientific experts devoting their energies to agricultural problems, it is estimated that the financial gain to the ryots of the Madras Presidency alone, during a few recent years, amounts to upwards of Rs. 3 crores. Before the War, the State of Mysore annually auctioned about 2,500 tons of sandalwood, most of which was exported to Germany for oil-extraction. A scientific study of the process, however, led to establishment of an experimental factory at Bangalore in 1916, followed by a larger factory at Mysore City, the joint effort under scientific supervision and equipped with modern plant having produced over 900,000 lb. of oil from 8,655 tons of sandalwood at the end of June, 1924. Thus the revenue to the State, formerly accruing by sale of sandalwood only, is now realised by selling the oil, and on that basis averages just over Rs. 19 lakhs per annum on a factory capital outlay of Rs. 6·9 lakhs; the actual profit is difficult to define because the raw material is a state monopoly, but the economic advantage of the foregoing procedure does not require definition. Considerations of this kind, which can easily be multiplied, must surely satisfy those who ask "what's the good?"

Variety of Species

Nevertheless, to diligent and earnest members of this Congress, it must always be the search for truth which takes the premier place in their motives and in their actions. Even if the loaves and fishes are not immediately attainable, there is generally half a loaf somewhere within reach; and fortified by this outlook which, believe me, is the only one worthy of a great nation, the opportunities for fruitful work which open before you are illimitable. Deep and lasting as is the happiness which chemistry has bestowed upon me, I have, since coming to India, constantly regretted my ignorance of entomology. In a delightful book by Sir Arthur Shipley entitled "Life," and modestly sub-titled "for elementary students," the following startling passage occurs: "I have recently had occasion to consult the authorities of the British Museum as to the number of known species. They estimate that mammals number 10,000; birds, 16,000; reptiles and amphibia, 9,000; fish, 20,000; mollusca, 60,000; crustacea, 12,000, whilst the number of insects is now put at 470,000, a little under half a million. These figures strongly support the view that insects are the most dominant creatures on our earth."

Can men of science themselves ever hope to grasp the significance of this marvel? At present they can only stand awe-struck at its fringe; but even the faint vision which is accorded to us, distorted and blurred as it doubtless is, will remain *purdah* to those who are required to worship the Almighty without being given the beginning of a glimpse into the wonders of His Works.

The accuracy with which specific attributes and peculiarities are transmitted amongst mammals is a familiar experience, and the miracle of its precise operation risks diminution in our minds by the circumstance that the example of a previous generation exercises an appreciable control over the conduct of the next. The "most dominant creatures on our earth," however, are untrammelled by such examples; they live, and move, and have their being, by instinct. The mechanism by which their prospective activities are enshrined in a microscopic speck of protoplasm cannot ever be understood by finite beings, however intelligent or however enlightened, because it involves, amongst many other factors, the fundamental distinction between animate and inanimate matter; but a suggestion as to the cause underlying variety of species does flicker across the dim threshold of bio-chemistry on which we now stand. The inanimate basis of living protoplasm is protein, and we do now know enough concerning the chemical nature of protein to realise that the various forms that it assumes are correlated with the permutations and combinations of amino-acids.

Amino-Acid Complex

When the different forms of protein are submitted to close chemical examination, they are found to yield a mixture of amino-acids, which have thus come to be regarded as the units from which the proteins are assembled. Whatever the origin of the protein may be, whether animal or vegetable, there will be some amino-acids found common to all the mixtures; but their proportion will vary according to their source, and an amino-acid arising from one form ot protein may be absent from the mixture derived from another form. Thus a chemical clue to the variation of species offers itself. Towards the conclusion of his life, Emil Fischer calculated that a polypeptide constructed from 30 molecules of amino-acids comprising glycine (5), alanine (4), leucine (3), lysine (3), tyrosine (2), phenylalanine (2) and thirteen various others, has a number of possible isomeric forms reaching $1{\cdot}28$ by 10^{27}. In this computation it is assumed that the mode of linking the amino-acids is limited to the conventional type of glycylglycine, but alternative junctions will suggest themselves to chemists and, if admitted, will substantially increase the above number of possibilities. May it not be that the secret of species lies locked in the pattern assumed by the relative amino-acid complex?

A practical answer to this inquiry may perhaps be drawn from an experiment by Fischer himself. On comparing the amino-acid mixtures respectively derived from the silk of the Madagascar spider and of the silk-worm he found that the principal significant distinction between them was the substitution of glutamic acid by the spider for the serine of the caterpillar. It is hardly possible to find a contrast between two creatures occupying the same physical medium greater than that provided by the spider and the silk-worm. On the one hand an alert, carnivorous and crafty savage, descending in the female sex to the villainously ungrateful practice of slaughtering its mate, and yet commanding admiration by the delicate symmetry of its web; on the other hand a grub, incapable of self-defence, much less aggression, monotonously unenterprising in its vegetarian taste, ingloriously terminating a brief career of unbridled greed by dreamily wrapping itself in a 500-yard cerement. Secretion of silk is the form of chemical self-expression imposed by Nature on these two creatures; yet, in spite of their tremendous divergence in outlook on life, they produce closely allied chemical substances as the concluding stage of synthetical operations which are quite unapproached in the laboratory.

The converse phenomenon is also familiar to chemists. The lac-insect which, with its vegetarian voracity and its limited spiritual prospect, can claim superiority to the silk-worm only by entering the romantic entanglements of courtship, bases its title as an accomplished synthetical organic chemist on the production of three individual substances, widely asunder in properties and structure, but all devoid of the most characteristic element in silk, namely, nitrogen. The superficial explanation of this difference in achievement is the fact that the insect absorbs the juices of twigs whilst the grub grows fat on a chlorophyllaceous diet; but the cause of this disparity in taste is a point of deeper and more subtle interest.

Chemical Basis of Character

May not the underlying chemical factor which determines instinctive ways of life be the qualitative and quantitative aspect of the amino-acid complex which represents the protein pertaining to the protoplasm of a species? The horizon bounding this reflection is a distant one. Among the outstanding results of modern research is the prodigious chemical effect producible by adroitly applying minute quantities of an appropriate substance. Future generations may concern themselves with the chemical basis of character as determined by the amino-acid complex. Refinement of method may even permit the quantitative examination of that complex during life, and the regulation of its failures by artificial means, just as the failures of the thyroid and the pancreas may be regulated now. A kindlier and more enlightened attitude towards our fellow-creatures may ensue. It is possible to imagine one of those character-dissections which are said to occur sometimes in European ladies' clubs, and which are believed to develop, now and then, a slightly censorious tendency, being terminated five hundred years hence by the charitable remark: "Well, my dear, it's very deplorable, but we have to remember that the polypeptanalysis reveals a lamentable deficiency in the hydroxyamino-acid modestine."

Be this as it may, abundant opportunity for sound, constructive and imaginative work offers itself now to the Indian devotee of science. Even those who are unhappily precluded by circumstances from a strictly scientific training need not, on that account, hold back if only they have the will to do. The example of Henri Fabre should appeal to this country more than to any other by reason of the special quality of your national genius and the wealth of entomological material which your dominion affords.

Empire of Reason

It is mainly to your universities, however, and the attitude towards new knowledge which is there developed, that we must look for future cultivators of the national field. In an opening address to the Universities' Conference last May, His Excellency the Viceroy signalised as the greatest service which your universities can perform, "to extend the Empire of reason in India until it is coterminous with the Empire fo India itself." Surely that is an aspiration sufficiently exalted to inflame the sacred enthusiasm of this country! In expanding the thought, His Excellency said: "Sentiment may be and indeed often is noble; it is universal; there is no mind so dull, no nature so callous, that some spark of sentiment cannot be found in it; but sentiment alone is an unsafe guide to decision. It is too often exercised on an object before reason has time to ascertain whether the object is worthy of its exercise; it is nearly related to prejudice; by itself it is insufficient and unstable ballast for any nation, and by trusting to it alone nations have suffered the ship of state to wreck. To weather the storms, and to bring the vessel into safe harbourage sentiment should be controlled and guided by reason."

These wise words are qualified for universal application. Reason, the faculty of mind by which man draws conclusions and is empowered to discern the truth, while becoming more and more diffused, remains vitally essential to the peace and happiness of mankind. Its full and balanced exercise is only possible when fortified by some knowledge of scientific developments because, without this equipment, every problem is at once thrown out of perspective. Relative to Infinity, the past has no greater importance than the future; it is the foundation on which Nature is, in the present, building futurity. Knowledge grows with immeasurable speed and the world correlatively shrinks apace. The West, throughout the ages, has accepted intellectual illumination from eastern repositories of ancient wisdom; more recently, the East has received its guerdon in the benefits of western science; the time is approaching when it will become an obligation on the East to return the shuttle of enlightenment.

Accelerators in Vulcanisation

Dr. F. S. Twiss and Mr. F. S. Thomas presented a paper on "A Comparative Study of Some Vulcanisation Accelerators" at the meeting of the Birmingham and Midland Section of the Society of Chemical Industry on January 13.

Experiments with a considerable number of accelerators indicated two types of accelerative action. In the first, the accelerator exerted its effect to the end of the usual range of vulcanisation experiments, whilst accelerators of the second type were active in the early stages of vulcanisation, after which, on account of the formation of inactive products, practically only unaccelerated vulcanisation took place. The terms "persistent" and "fugitive" were applied to these two types of accelerative effect.

A review of the inorganic and organic accelerators and details of their individual actions were given.

In a discussion, Professor G. T. Morgan asked if experiments had been made with some of the rare earths having an alkaline base? Dr. Twiss replied that so far as he knew they had not been tried, but he doubted if they could be obtainable sufficiently cheaply for the purpose. All substances did not accelerate simply because they were alkaline..

At the same meeting a paper on "The Testing of Resistance to Tearing" was read by Mr. H. L. Heathcote, F.I.C., as reported in The Chemical Age last week.

"Chemistry and Civilisation": Hurter Memorial Lecture

By Sir Max Muspratt

"CHEMISTRY and Civilisation" was the title chosen by Sir Max Muspratt, Bart., for his Hurter Memorial Lecture, delivered on Friday evening, January 16, at the Liverpool University, before the Liverpool Section of the Society of Chemical Industry. There was a large attendance, including many ladies. The meeting was preceded by a dinner at the University Club.

Mr. EDWIN THOMPSON, who presided, said that Dr. Hurter was one of the original members of their Society, and a member of the committee of the Liverpool Section from its commencement; he was twice vice-president of the Society, and for two years was chairman of the Section. Dr. Hurter's work on behalf of industrial chemistry was known throughout the world, as was his work on the scientific side of photography. He often wondered how many of the hundreds of thousands of amateur photographers, when they saw the letters "H. and D." and a speed number on a box of plates, realised what they owed to Hurter and Driffield. Dr. Hurter was chief chemist to the United Alkali Co., and they would agree that they were honoured by having Sir Max Muspratt as the Hurter Memorial Lecturer. (Applause.) The greatest honour which could be paid by the Section to any man was to invite him to deliver that lecture. The Chairman mentioned that Sir Max Muspratt had declined the fee which was usually attached to the lecture, requesting that it might be added to the amount to be paid to the next lecturer, and he expressed the thanks of the Society to Sir Max for his generosity.

The Conquest of Nature

Sir MAX MUSPRATT, who was very warmly received, said it was just thirty years ago that he entered the central laboratory at Widnes under Dr. Hurter. For the few remaining years of the doctor's life he was in daily touch with him, and he had found but few men with so broad an outlook or such deep human sympathy, combined with profound scientific attainments.

The history of civilisation, he continued, was the struggle of man in bending nature to his service. Nature was a lavish mother, but she yielded her secrets but slowly and reluctantly. Man's development for countless ages was by experience and rule of thumb. Through the Stone Age, the Bronze Age, the Iron Age, a steady progress in material standards took place, and this was almost invariably accompanied by intellectual and moral progress. Later, many of the basic chemicals came into practical use—natural soda, potash from kelp, simple oils and fats, natural dyes and drugs. But with the advent of the industrial era, accompanied by rapid increase and concentration of population, the natural sources became quite inadequate and it was chemistry and the chemical industry that had made the modern world possible. Indeed, without chemistry the great aggregation of population would have resulted in the ultimate destruction of civilised man.

Starting with sulphuric acid, and progressing through alkali, chlorine, and coal tar products, to dyes, drugs, disinfectants, antiseptics, refrigerating and building materials, metals, alloys, textiles, fertilisers, and countless other products, chemical industry brought within reach of myriads what had formerly been the luxuries of the few, in food, houses, clothing, health, transport, amenities of life, and alleviation of disease. This was not to underrate the service of the sister science, physics, which in its practical form, engineering, and especially electrical engineering, usually claimed the lion's share of credit for material progress.

Triumphs Yet to Come

The foundations of modern civilisation were chemistry, physics, and engineering; but the greatest was chemistry, for the chemist thought in atoms and achieved in tons and thousands of tons, and taught the practical man in other industries the essential characteristics of the materials with which he worked. But there were vast new fields opening out. Chemists had hitherto proceeded by three methods—dissection, stimulation, and imitation of nature; but they had not attained an efficiency comparable with that of nature itself. The best factory process did not compare in efficiency with nature in a cornfield.

The line of future chemical progress was not only in copying but in wresting the secret processes of nature from her. A great step had been taken in the fixation of nitrogen from the atmosphere, by which every field became potentially self-supporting, instead of depending on nitre from Chile or ammonia from gasworks or coke ovens; and the problem of phosphates, the other great fertilising agent, might be capable of similar solution. Bio-chemistry and radio-activity opened even greater vistas, where the actual processes of nature might be reproduced for the service of man.

But civilisation could not rest on material progress alone, and the most superficial thinker must realise that the growth of material civilisation had outpaced the mental and spiritual development of man. Our homes were in the main civilised, but our cities were not. Much of the unrest to-day was due to a vague feeling that the individual was submerged in a civilisation that he did not control or understand. The human factor must not be swallowed by the machine, or civilisation was doomed. Man was more important than industry.

Was it too much to suggest that in addition to being a specialist the chemist had by his training a special fitness to be a leader of thought in citizenship? He was accustomed to think in terms of infinitesimal units in order to achieve results of supreme magnitude. Was not there a counterpart in the social problems of mankind? The infinite atoms of humanity wanted studying and guiding so that their vitality and individuality might be retained, but all were combined to a finer co-operative civilisation. He commended all chemists to add this view point to their life's work. (Applause.)

Votes of Thanks

In proposing a vote of thanks to the lecturer, Mr. W. J. U. WOOLCOCK, the President of the Society of Chemical Industry, said there was one thing lacking among chemists, and that was the quality of popular expression. The chemists of the country suffered greatly from this defect. Whilst they had been capable of making the most wonderful discoveries—fortunately for England—they had been lacking in finding among their leaders men who had the power of popular expression in order that they might carry with them the voice of the country. They had felt that their work, and their work alone, must speak for them, but that was not sufficient. Referring to Sir Max's visit to America he said that Sir Max had expressed scientific views in a popular way, and that night he had shown them something of what could be achieved in that direction. (Applause.)

Dr. ADAMI, the Vice-Chancellor of the University of Liverpool, in seconding the vote of thanks, said that each one of them, if they were devoted to their particular work and gave themselves up to it, thought that that particular work was "it," and that in it was the essence of culture and civilisation. Therefore they could sympathise with Sir Max in his most eloquent and charming exhortation that chemistry was the very essence of modern civilisation. However, as Vice-Chancellor of the University, he felt it his duty to remind them that there were other considerations, such as the humanities, and the whole group of those included in "art" subjects. Sir Max fully admitted in his later remarks that there was a spiritual and intellectual side, and that they had a distinction apart from civilisation. Sir Max, highly as he had exploited the subject of chemistry, had shown them by his address that there was something more in life than chemistry, something more than substituted products, and so he thought they ought all to pull together.

The vote was carried with acclamation. In responding, Sir Max said that he did not in any way deprecate other branches of science, but he did claim that chemistry was the keystone of the efforts in trying to give civilisation something which it had not at present got.

A vote of thanks to the Chairman concluded the proceedings.

A Review of the American Dyestuffs Industry

Results of a Ten Years' Campaign

The following article, taken from the "Colour Trade Journal" of New York, gives a critical survey of the progress of the American dyestuffs industry during the last ten years, and shows how similar the problems to be overcome have been in the United States and this country.

It is now almost ten years since the people of the United States turned their serious attention towards the establishment of a dyestuff industry in this country as a distinct and independent national enterprise. The struggles, the vicissitudes, the victories, the wide margin of profits and many other features are now matters that have passed and repose in the archives of history. Out of the turmoil and confusion of a battle for birth and existence the dyestuff industry of this country has emerged to an established place among the recognised enterprises of the nation.

Early Illusions

We began the manufacture of dyestuffs out of necessity and under conditions that in one sense were inconceivably difficult to overcome. In another sense, however, the conditions were exceedingly favourable; that is to say, the economic conditions were such that almost any kind of colouring matter could be sold at a fancy price to customers who were falling over each other to get their share. There was practically no competition from abroad, and the mills were willing to put up with all manner of makeshift simply to get a dye.

These times have passed and another aspect greets our vision. The initial onrush of dyestuff manufacture was so great and the demand for the products was so persistent that the thing was naturally more or less overdone, and many fools rushed in where the more timid angels almost feared to tread. The manufacturing capacity for dyestuffs in this country went far ahead of our actual needs. People with no experience and with no conception of the problems of dyestuff manufacture and distribution and use, erected plants and squandered capital in a vain attempt to make products which at the moment were in great demand. To make these products successfully, however, required a great amount of research and the development of a complicated technique, and by the time this was acquired and the products more or less successfully produced, their pressing need, perhaps, had passed away, the prices had dropped, and so much money had been squandered that financial embarrassment was the result.

After the first great glory had passed, when some had already taken their profits and others had reinvested them or were still looking for them, the keen edge of domestic competition began to be felt. The war was over. The mills were no longer scrambling to get almost any kind of dyestuff that might be available; they began to pick and choose, they made demands for quality and uniformity; prices no longer permitted a wide margin of profit. The manufacturer who was not equipped to meet the economic conditions soon gave up manufacture. As we look back on the progress of the industry we cannot fail to see quite a number of derelicts still floating around while others have sunk completely beneath the waves, "unknelled, uncoffined and unknown."

There were, however, a number who had builded on firm and safe foundations; some real chemists and thorough-going business men had gone into the making of dyestuffs, and they had sufficient vision to erect a properly constructed edifice that was meant to develop and to last beyond the compelling exigencies of the times. Efficient sales organisations were set up and the necessary service was furnished to the dyer and the mill. The dyestuff products were standardised and care was used to maintain their uniformity and strength and quality. A reputation was established and a permanent business insured.

The Pro-German Bias

But all this was carried out under very adverse circumstances; not only were the natural obstacles in successful manufacture and efficient production to be met, but it was also necessary to overcome a strange prejudice on the part of the public and many mills against the idea that Americans could ever manufacture dyestuffs equal in quality to those made abroad. This was encouraged by the fact that there were still quite a lot of valuable and necessary dyes that we did not then make, and the demand of these from abroad gave the impression that our domestic dyes were more or less makeshifts and that the really good dyes would have to be obtained from Germany.

It was said at the time that all this was due to "German propaganda"; some of it may have been, though Germany was rather disorganised at the time and was scarcely in a position to give rise to much "propaganda" so far from home. The chief factor in this idea that American-made dyes could not be as good as foreign dyes lay in the natural tendency of the American mind to think disparagingly of its home products. The dyestuff industry had so long been considered as *par excellence* a German enterprise that the layman was apt to regard the upstart American industry as something exotic and foreign to our genius. We find the same thing true even at the present day of many other things; if we go into a tailor's shop to order a suit of clothes the proprietor is sure to lay before us "imported English woollens or worsteds" as being the only thing worth considering. . . . It is due simply to the natural cussedness of the American consumer in thinking that something imported is always better than what he can make himself.

Familiar examples will rise in the minds of anyone. The woman who bought a pair of stockings and found that the colour ran badly on the first washing immediately jumped to the conclusion that American-made dyes were responsible for the trouble. The salesman who sold her the goods and received her complaint merely shrugged his shoulders and repeated the trite remark: "Madam, we cannot be responsible for the colour because our manufacturers cannot obtain the proper dyes and are forced to use American colours."

As a matter of fact, during that strenuous period of adjustment when our manufacturers were doing their best to make the needed dyes called for by the mills, there were many dyes, both of American and foreign make, that were used improperly for the dyeing of materials for which they were not intended. Rather than leave the goods undyed or say that they could not supply certain shades, manufacturers and dyers adopted the makeshift of employing colouring matters totally unsuited to the purpose. Fortunately these conditions have now passed away and our dyestuff factories are producing a line of colouring matters complete enough to supply practically all the needs of the mills. We do not find the basis of complaint now as in former years; the consumer is apparently satisfied with the quality of the colours, but perhaps does not pause to think that practically all of these colours are now obtained with American-made dyes, for the dyestuff census tells us that about 96 per cent. of the dyes used in this country are now of domestic production.

Some Dyestuffs Still Imported

There are still some dyestuffs imported, and it is perfectly natural that such should be the case. These come almost entirely from Germany and Switzerland and represent merely a normal economic condition. We are the greatest silk manufacturing country in the world, and yet we also import a considerable amount of silk goods from European countries. There are specialities in dyes and in silks that can be profitably imported and sold in competition with the domestic articles. It is no disparagement to our domestic industry that such importations should exist. In fact, the importations in the case of dyestuffs are really smaller than we would expect, and we would anticipate that when trade relations with Europe become more and more firmly established, such importations will even rise somewhat. On the other hand, we find that our exportations of domestic dyestuffs to foreign countries are also quite encouraging in amount, being considerably in excess, in fact, of our importations. This is a healthy condition and we believe these importations will continue to develop under the natural encouragement of a reviving trade.

The Danger of Over-Capitalisation

There is one outstanding criticism that has been made of the American dyestuff industry as indicating a factor of instability. This is the apparent over-capitalisation of the industry in proportion to the value of its annual turnover in manufactured products. While it is perhaps practically impossible to arrive at a very accurate estimate of the actual amount of capital that has been thrown into the dyestuff business here in this country together with the necessarily associated enterprises, the estimate of $150,000,000 is perhaps fairly near the truth. With a yearly turnover of only about one-half this amount in manufactured products, the economist would be inclined to consider that the business was heavily over-capitalised and unnecessarily burdened with interest charges and overhead expenses. Under the present conditions of trade it is not likely that profits will be so high as to permit of any radical reduction or writing off of this heavy capitalisation. Many of the companies who realise their unbalanced economic status are endeavouring to correct this evil by reducing their expenses as far as possible. Research staffs, new developments, advertising, and all the many ramifications where expense cannot be directly productive of profit have been cut down to the smallest allowable figures, the desire of the directors always being to lessen the overhead expense and bring about a better balancing of their budgets.

Real Competition Ahead

While this policy may show a present improvement in the condition of the company, the question naturally arises as to whether or not it will work to the detriment of the company eventually. The years of real competition in the dyestuff business lie ahead of us, we are simply just beginning to enter upon that era. We will have in the near future keener competition from abroad and keener competition at home. It will be found harder to maintain our exportations to foreign countries unless we keep well abreast of the times. Research has been the soul of the dyestuff industry, and it is still the soul that keeps it alive and ever progressive. New products must be continually under way, and the factory that stands still and rests on its oars will soon be found to be floating backward while the others are speeding up the stream of fresh discoveries and improved products at present unknown and unrealised. The dyestuff factory that practically gives up its research department and eliminates its qualified research chemists is facing backward instead of forward. Though it is saving a few dollars to-day it is relinquishing inestimable values in prestige and position ten years from now.

Advertising

The same thing is true of advertising. The company that drifts out of sight on the ebbing tides of indifference to popular appeal or a desire to maintain a position of prominence before the industries to which it should appeal is committing a big mistake. The value of advertising in the dyestuff business is not to be measured by the direct increment in the sales of to-day, but by the prestige and popularity acquired that makes future business the more easily obtained. The German dyestuff firms years ago created a tremendous prestige for themselves through their wide and extensive advertising; and that prestige exists even to the present day, so deeply has it been branded into the minds of the world by advertising. The recovery of Germany will no doubt witness a resurgence of the advertising of their dyestuff products. Are American firms to be found fading out of the limelight just at the time when they should be most in it?

Tests for Explosives

COLONEL G. R. LANE-FOX, M.P., Secretary for Mines, announces that as part of its inquiry into the possibility of improving the present official tests to which explosives are submitted before they are "permitted" for use in gassy or dusty coal mines in Britain, the Safety in Mines Research Board arranged for seven typical British "permitted" explosives to be put to the official tests applicable to American "permissible" mining explosives. Though the full reports of the tests have not yet been received from America, the Board has been officially informed that all the British explosives passed the American tests.

Bradford Dyers' Dole Dispute

Umpire's Verdict in a Test Case

THE Unemployment Insurance umpire, Mr. J. G. Pease, has given his decision on the question of whether operative dyers at Bradford who work three days a week and are able to earn as much as 18s. or £1 a day are entitled to draw half a week's unemployment benefit in addition. It was regarded as a test case.

The umpire's report is as follows:—"Under decision number 8533 I agreed that the recommendation of the Court of Referees that employees whose normal full week's work is constituted of four shifts of twelve hours each shift are not unemployed on any days in any week in which they have worked forty-eight hours. Benefit is payable in respect of each week of unemployment, and a person is not unemployed in any part of a week in which he has done a full week's work.

"The question now arises as to the number of days on which employees working on this system are entitled to be regarded as unemployed when they are working on short time, and doing only one, two, or three shifts instead of four in any week. The applicant in whose name the question is raised is not, apparently, an employee whose normal full week's work is one of forty-eight hours in four shifts, and I give no decision as to his claim but treat the appeal as a question referred by the insurance officer under the Act of 1920.

"My answer to the question so far as it relates to employees to whom decision 8533 applies is as follows: If such an employee works one shift only in any week he is to be treated as unemployed on five days; if in any week he works two shifts only, he is to be treated as unemployed on three days in that week; if in any week he works three shifts only, he is to be treated as unemployed on two days."

Compressed Air in the Chemical Industry

REFERENCE to the use of compressed air in the chemical industry was made by Mr. Robert Wilson, London manager for Alley, MacLellan, Ltd., engineers, Glasgow, in a paper read before the members of the Institution of Engineers-in-Charge, in St. Bride Institute, London, on January 14. After tracing the history of the use of compressed air in various industries since its introduction eighty years ago, he said the system was now used extensively in the chemical, dyeing, cleaning, and cotton trades, in glass works, in laundries, in breweries, and in oil refineries. Most types of gas and oil engines needed its service every time they were started.

For two well-known pumping processes compressed air was employed as the motive power, namely, displacement pumping and the air lift. Displacement pumping was adopted for the transference of liquors, chemicals, acids, pulps, sewage, semi-solids such as sand, grain and powdered fuel, and for any accumulations or mixtures for which mechanical pumps were unsuited or inconvenient. The fluid or matter to be transferred flowed by gravity into a closed chamber. When the chamber was nearly full compressed air was admitted and the contents were forced out. For the transference of most chemical and other liquors the action was automatic by means of an air valve controlled by a float. Check valves controlled the admission and discharge of the liquor.

Compressed air was used in glass works as an atomiser in operating oil burners in the glass furnaces and steam boilers. Agitating liquors by compressed air was a process preferred to mechanical stirring or mixing in chemical and kindred industries. The agitation was effected by means of perforated air pipes arranged in the bottom of the tank. The extent of the agitation could be varied by regulating the quantity of air passing to the air pipe. The system eliminated the possibility of injurious foreign substances entering the solution and was much more simple to accommodate than a mechanical mixer.

Other uses in which compressed air was found useful were those connected with the spraying of paint, enamel, whitewash, disinfectant liquid, and acids. Pneumatic power could be transmitted over long distances with small loss in pressure.

Calendars and Diaries

FROM Scottish Dyes, Ltd., we have received a handy pocket diary, neatly bound in brown morocco leather, complete with pencil and detachable note-book. Besides containing the usual general diary information there are several useful tables and notes of particular interest to users of the firm's well-known Caledon, Solway, and Celatine colours.

A Mixed Ammonia-Phosphate Fertiliser

To the Editor of THE CHEMICAL AGE.

SIR,—Your valued comment on N.P.K. in the issue of January 10 refers to the question of using calcium superphosphate instead of crude phosphoric acid for the fixation of ammonia. I gladly avail myself of the opportunity of suggesting a few points for consideration.

Since the object is to make an attractive fertiliser, the question of unit value is of great importance. I am not aware of the existence here of an official "list of unit values" corresponding to that issued in Australia. In that for the year 1924, under the Fertilisers Act of 1915 for Victoria, "water soluble" phosphoric acid is rated at 4s. 10d. per unit and "basic phosphate" is placed at 6s. per unit, an increase of 25 per cent. I should remark that this refers to "citrate soluble" basic phosphate as "bone fertilisers," there being no "water soluble" basic phosphate in the list.

Probably I am correct in claiming that the salt ammonium-phosphate, even if no higher than the di-stage, may claim to rank as a basic phosphate or equal.

Exactly what is claimed for the calcium superphosphate method of ammonia fixation as to extent of absorption and freedom from reversion in the soil, I am sorry to say I do not know. In any case, calcium sulphate must remain as a useless dilution.

Whilst superphosphate is bulky, and has a comparatively weak affinity for ammonia, phosphoric acid has a great affinity for it. A ton of H_3PO_4 combines with from 6 cwt. to 10 cwt. of NH_3 to the 1 cwt. which it is assumed can be fixed by a ton of 30 per cent. superphosphate.

The fertiliser produced by the superphosphate fixation method can only possess a low concentration, but an N.P.K. fertiliser, ignoring for the moment K_2O, can range (di-stage only) at least up to 20 per cent. NH_3, 60 per cent. H_3PO_4, 20 per cent. humus. A ton of this analysis is equal manurially to three or four tons of the superphosphate-ammonia mixture, and it also does not add to the soil a useless diluent.

The full move forward in the saving of sulphuric, of which the superphosphate method is only a portion, can be made at little, if any further expense. By mixing phosphate rock with an excess of sulphuric acid over that required for making superphosphate, the elimination of calcium sulphate is secured without expense, since the H_2SO_4 as represented by H_3PO_4 also functions in the fixation of ammonia.

It appears reasonable to suppose that in a properly developed works it would be simpler to mix rock with sulphuric and to wash out crude phosphoric acid than it is to produce superphosphate with the same amount of sulphuric added to a larger amount of rock, in an elaborate plant. Continuing the process, it should be easier to strip a gas containing ammonia by means of a liquid of great affinity than by a semi-insoluble material.

I hope that these remarks may in some degree establish the claims of N.P.K. Thanking you for the interest expressed in the notice, I am, etc.,

Hurworth Moor, Darlington. ED. LLOYD PEASE.
January 21.

All-British Balances

To the Editor of THE CHEMICAL AGE.

SIR,—At the meeting of the Physical Society recently held at the Imperial Institute, where we were exhibiting balances, a visitor to our stand remarked to our representative that he had been informed that "Oertlings were importing parts of German balances and merely assembling them in this country."

The gentleman did not give his name, nor the source from which he obtained his information, and as there is not an atom of truth in the suggestion we should be greatly obliged if you will assist us in giving publicity to the fact that all our balances are manufactured entirely at our works in Turnmill Street, E.C.1.

It is of the greatest importance to us that in these days of strenuous competition against unequal odds, those users of balances who prefer the British article be assured of obtaining their desire by indenting for an "Oertling" balance.—Yours, etc.,

For L. OERTLING, LTD.
M. DUNBAR, Director.

The Facts About Plastic Wood

To the Editor of THE CHEMICAL AGE.

SIR,—A Berlin message widely quoted in the British Press states that the "latest invention," apparently in Germany, is a plastic wood which is sold in tin boxes. It is said that this plastic wood can be moulded into any shape, when it sets firmly, and can then be carved and polished in the manner of ordinary wood. It is impervious to water when set, and is not influenced either by heat or cold.

These statements appear so accurately to describe the qualities of plastic wood as prepared by one of the constituent companies of Nobel Industries that there can be no doubt they refer to the British product. In common fairness, therefore, to British scientists and British laboratories, we feel it our duty to state the true position.

Plastic wood has been made for some time past at our factory at Stowmarket. It has attracted a great deal of attention on the Continent, and that, we believe, is the explanation of the fact that the story of a purely British invention should have, paradoxically enough, inspired a news message from Berlin.—Yours, etc.,

J. C. STAMP,
Nobel House, London, S.W.1. Director and Secretary,
January 17. Nobel Industries, Ltd.

Smokeless Fuel Experiments

To the Editor of THE CHEMICAL AGE.

SIR,—We have been shown that dust is necessary for the production of fog from saturated or nearly saturated air, yet in spite of good resolutions whilst the fog is here we go on burning precious fuel in our gipsy fireplaces just the same.

Many years ago attempts were made at the Royal School of Mines to make a composite fuel which could be adjusted to burn with a slight flame but not a smoky one. The leading idea for the experiments was to grind some ordinary house coal with coke or/and anthracite and a small amount of sawdust or like material. The proportions of the ingredients (coke, anthracite, sawdust) were determined by the amount of volatile matters in the coal, as ascertained by heating in a covered platinum crucible. The mixture was ground wet to a moderately smooth paste and pressed into rods a few inches long and somewhat less than one inch diameter, and then air-dried.

Difficulty was experienced in making the materials cohere, even with considerable pressure in the shaping. It burnt well and without smoke. Pitch as an agglutinant made the mixture burn smokily. Glue was a moderate success, but no doubt was too expensive to use on a large scale. Silicate of soda was quite good, but in the 'seventies and early 'eighties of last century was not so easily obtainable as now, or possibly a practically smokeless fuel suitable for the ordinary house fire would have been evolved by this time to the betterment of our atmosphere.

During the interval 1914–1920 experiments with silicate of soda as a binder for materials similar to those just mentioned were fairly satisfactory, and it should not now be difficult or too expensive to grind a suitable mixture of coal, coke or/and anthracite and sawdust, or other cellulosic waste material, into a fine paste with water glass and extrude the mass, like making cordite, in rod form, collecting on an endless band and passing through a drying zone.

Whether it would be a paying proposition depends perhaps mainly on the cost of coal dust and grinding. No doubt waste coal (smalls) such as is not always brought up, would do for this purpose.—Yours, etc.,

January 14. W. R. H.

German Tariff on British Goods

THE Board of Trade is informed by the Foreign Office that although the Anglo-German Treaty of Commerce and Navigation has not yet been ratified, the German Government has given orders that, after January 10, goods of United Kingdom production or manufacture are to be treated on the basis of the most-favoured-nation until further notice. Similar treatment will be accorded in Germany to goods produced or manufactured in other parts of the Empire except Canada, Australia, and New Zealand, which do not accord most-favoured-nation treatment to German goods.

Research Work at Birmingham University

Some Notable Achievements

In a recent issue of the "Birmingham Mail" appears an interesting article in which recent research work at the University of Birmingham is briefly reviewed. The article is signed by "G. T. M.—W. W."—initials which may pretty safely be taken to indicate Professor G. T. Morgan and his colleague, Dr. Wardlaw.

"SCIENCE has always seemed to me to provide the real romance of life." This opinion of Lord Buckmaster appears to have good grounds for justification. At the present time we are thrilled by the romance of wireless and the endless vista of possibilities which it opens up for the future. Daily we are surrounded by countless scientific achievements probably equally wonderful, but we have ceased to wonder at them because they have lost their novelty.

If we consider the early years of any great scientific process or invention, we shall see that the great triumph of to-day is merely the bringing to fruition of many observations and experiments which in most cases originally had for their sole aim the furthering of scientific knowledge. How often does the worker in pure science hear the question, "Why lavish all this time and trouble in gathering some trifling item of extra knowledge, which in all probability will never become of the least importance in your hands?" Such a question would not be asked if the questioner was at all familar with the history of scientific discovery. Many are the cases which could be quoted to show that the apparently trifling item of knowledge has at a later period "shaped a million destinies."

Much of the work which is being done in the laboratories of our universities may not strike the popular imagination. Nevertheless, it comes under the category of an essential activity of any university. Ranke told us "that the true purpose of a university is to communicate to the minds of the young generation not only science in the state of completeness but also science in the state of growth."

That this purpose is being achieved as far as our Birmingham University is concerned may be readily gauged by an examination of the activities of a typical research school, such as the Department of Chemistry. In this research school large numbers of workers are learning the technique of scientific investigation so that they may be qualified to pursue at a later date in the laboratories of far-sighted manufacturers investigations on specific commercial problems. It is difficult to indicate in popular terms the purpose of the numerous investigations at present being conducted in the Department of Chemistry, but the following notes may be of interest.

Science and Industry

Borax is known to us all as a useful chemical, but one of its constituent elements—boron—is still in need of further investigation, and a paper has recently been published dealing with certain important reactions in which it is involved.

As an example of a much rarer element which affords great scope for scientific inquiry germanium may be cited. The richest sources of this very rare element are the spelter residues from certain American zinc ores, especially those of Wisconsin and Missouri. This rare element is classified by chemists as a member of a group which includes tin and lead, together with silicon, titanium, zirconium, cerium, and thorium. The oxides of these last two metals are familiar to us as the light-giving constituents in a gas mantle, the maximum light intensity being obtained when 99 per cent. of the oxide of thorium is present with 1 per cent. of cerium oxide. With the exception of germanium, all these elements have given compounds with a useful reagent known as acetylacetone, a compound which, in the words of Sir William Crookes, has the capacity of "giving wings to the metals." As a result of a recent investigation this reagent has shown its ability to form distinctive derivatives with germanium, a result which justifies the chemist's method of classifying germanium and its analogues.

Recently there appeared in the Press an account of a new wireless valve which substitutes the metal tungsten by molybdenum. The latter metal, which occurs in Nature as a compound with sulphur, is widely distributed over the entire earth's surface. In 1915 the United States of America was the chief producer of the natural ore known as molybdenite; in 1917 Canada led the list of producers; whilst in 1918 the United States of America produced the largest amount of this ore ever mined in any country. Our knowledge of the chemistry of this element is still far from complete, but is being added to as a result of investigations in the Chemistry Department.

During the year details of a process have been published which should be capable of superseding in certain conditions the existing method of separating nickel and cobalt. Metallic cobalt and its salts are obtained from certain arsenical cobalt ores containing considerable amounts of nickel and iron with metals such as copper and bismuth, and the process now in use is identical with that worked half a century ago. The new process proposed is the outcome of researches originally directed to the important problem of determining the principles underlying the combination of elements with other elements and groups of elements.

Birmingham and Synthetic Rubber

Since its foundation by Sir William Tilden in 1880 the Birmingham Chemical School has played an important part in discoveries relating to substances which in appropriate solution have the power of rotating the plane of polarised light. This property is characteristic of substances arising from the vital activities of living vegetable or animal organisms. It was in the course of his researches on terpenes—one of these optically active series—that Tilden in 1892 first produced india-rubber artificially. This epoch-making discovery, made in the Mason College, attracted little attention at the time, but 20 years later the production of synthetic rubber was being actively prosecuted by two groups of chemists in England and in Germany. During the war considerable quantities of this material were manufactured and utilised in the latter country.

Wool and silk are textile fibres of animal origin, and their constituent compounds have probably the bias which is characteristic of optically active substances. It has recently been found that wool absorbs dyes of right and left-handed bias at slightly different rates, thus indicating a connection between the molecular structures of the fibre and of the colouring matter.

One incentive to the discovery of new chemical compounds is the possibility that certain of these products may have useful physiological properties, and included in the new group of tellurium compounds discovered in Birmingham University about three years ago have been found many substances having outstanding germicidal properties. Even in extreme dilution these tellurium derivatives have the power not merely of inhibiting but actually of destroying the growth of pathogenic bacteria. It is too early yet to say whether these properties will be turned to practical use in therapeutics, but the investigation is being actively prosecuted in the direction of obtaining as many types as possible of organic derivatives of tellurium likely to have the properties of successful bactericides capable of being employed in medicine.

Liquid Fuel

The increasingly important part played by rock oil or petroleum in everyday life lends interest to the recent synthesis at the university of a paraffin not hitherto found in Nature. This substance, tetraethylmethane or carbon tetraethyl, which has the physical and chemical properties of light petroleum, exhibits also certain points of considerable scientific interest likely to throw light on the molecular structure of natural paraffins.

The dyeing of textile fibres, skins and woven fabrics has long had a fascination for man in rudimentary and advanced stages of civilisation. In 1914 it was seen that dyemaking was a key industry deserving of support by any nation desirous of maintaining its military supremacy against all comers. The manufacture of service explosives and the production of dyes are closely interlinked, the plants for the latter purpose being readily diverted to warlike uses. It is accordingly necessary to keep a watchful eye on the advances in the coal-tar industry.

The interest shown by Continental chemists in this branch of organic chemistry is unceasing. Several research workers in Birmingham are occupied in studying coal-tar products. A series of dyed patterns illustrating certain new colouring matters was exhibited at Wembley, and more recently considerable progress has been made in the chemistry of acenaph

thene and fluorene, two hydro-carbons from coal-tar, for which industrial application is still required.

Such discoveries are frequent and inevitable incidents in the life of an active research institution. There is a daily accumulation of scientific knowledge, some of which sooner or later will certainly be brought into the service of humanity.

Sulphur: A Colour Producing Element

Presidential Address by Professor Morgan

In his presidential address to the Birmingham University Chemical Society, delivered on Monday, Professor G. T. Morgan referred to the differences in colour manifested by allotropic modifications of sulphur.

In its various crystalline forms, Professor Morgan said, the molecules of this element were arranged in different ways to produce dissimilar crystal units. This existence of a substance in different crystalline species was known as polymorphism. There were, however, differences observable even in the liquid condition of sulphur, and these modifications were due to dissimilarities in the mode of arrangement of sulphur atoms within the sulphur molecule. Varieties of the same substance arising from differences in molecular architecture were grouped under the general term, isomerism. Even in the gaseous state, sulphur existed in two or more different conditions, and these differences were due to polymerism or changes in the number of atoms in the molecule. These three phenomena, polymorphism, isomerism and polymerism, were, in the case of elementary substances such as sulphur, sometimes regarded as constituting different types of allotropy.

In the allotropes of sulphur, which exhibited characteristic shades of colour, they had this striking case of an element existing in several definite modifications endowed with different amounts of chemical energy.

Bergmann's Analysis

The application of sulphuretted hydrogen to chemical analysis by Bergmann towards the end of the eighteenth century was perhaps the first scientific use of sulphur as a colour producing element. The colours exhibited by the analytically important metallic sulphides were considered and also the employment of certain of these compounds as inorganic pigments. A relationship was traced between the colours of metallic sulphides and their heats of formation.

The manifestation of visible colour induced by the accumulation of sulphur in the molecules of chemical compounds was exemplified by the conversion of colourless alkali monosulphides into highly coloured polysulphides. The various hypotheses held in regard to the chemical nature of ultramarine were reviewed.

The case of carbon bisulphide was cited in illustrating the arbitrary distinction between visible and invisible colour. A consideration of coloured organic compounds containing sulphur led to a survey of typical sulphur dyes. Methylene blue and brilliant alizarine blue were selected as basic and acidic representatives respectively of the thiazine series. The thiazoles were demonstrated by dyeing and photographic experiments on primulin. Sulphur, it was pointed out, entered notably into the composition of many modern vat dyes of indigoid type, and the dyeings made under this heading were carried out with the B.D.C. series of Durindone colouring matters.

Evolution of Sulphide Dyes

The evolution of sulphide dyes was outlined from the early pioneering attempts with brown Cachou de Laval to the more scientific production of dinitrophenol black and other thionol colours. An outstanding success in this field of chemical research was Hydron Blue, a sulphur colour employed as a vat dye. This important modern rival of time-honoured indigo was now being manufactured in England by the British Alizarine Company and the dyeings were demonstrated with the product from this firm. Further developments in the application of sulphur to the production of vat dyes were indicated by experiments made with Duranthrene Olive of the British Dyestuffs Corporation.

As the result of these and other advances, the technique of the colour using industries was altering considerably, fugitive dyes were becoming replaced by faster colouring matters of the vat series, and in these current changes the use of sulphur as a colour producing reagent was playing an important part.

Society of Dyers and Colourists

A Paper on S.R.A. Colours

A meeting of the Manchester Junior Section of the Society of Dyers and Colourists was held in the Lecture Hall of the Literary and Philosophical Society on Friday, January 16, to which the members of the Senior Section had been invited to attend. Mr. J. W. McManus presided.

In a paper on "The S.R.A. Colours in Modern Colouring Practice on Celanese," Mr. G. Holland Ellis, A.M.C.T., A.I.C., said that it was recognised many years ago that there was considerable possibility in the use of cellulose acetate as a textile fibre in view of its stable properties and its solubility in a number of organic solvents. Early attempts to utilise the product commercially were not brought to fruition, and there appeared to be little or no records available. After the very considerable employment of cellulose acetate during the war, the consumption in the early post-war days fell to very small dimensions, leaving a large factory, specially erected for its production, largely idle. The durability of cellulose acetate had now been definitely established, and it had other advantageous qualities which were promising from a textile point of view. It was made up by the so-called "Dreyfus" process. The early experience of the spinning of cellulose acetate into commercial fibres was very toilsome and there were many disappointments. Celanese was relatively impermeable, and in early days this led to a process of drastic swelling being resorted to by the use of aniline and other substances. The permeation of Celanese was largely governed by the surface tension of the liquors employed, by temperatures, and particularly by the time factor. Its characteristic physical properties were chiefly those of low conductivity of heat and electricity.

The S.R.A. colour bases were concentrated and took the form of fine paste. Partly colloidal and partly fine-suspension systems were formed which dyed satisfactorily. All the colours were inter-miscible one with another for the production of compound shades. They were insoluble in water, and therefore fast to washing and also exhibited excellent fastness to light.

The range of colours was described by Mr. Ellis in detail, and a great variety of beautiful fabrics, yarns, etc., dyed by them was exhibited. Finally, it was explained that many dyestuffs for other fibres did not dye Celanese and that the S.R.A. colours would only dye Celanese and not other fibres. Therefore, by using mixtures of the various types it was possible to obtain totally different colours upon white material containing different fibres.

Dyeing of Acetyl Silk

A meeting of the Senior Section was subsequently held when a short paper entitled "Note on the Dyeing of Acetyl Silk with certain Insoluble Azo Colours in Statu Nascendi," was read by Professor E. Knecht, Ph.D., M.Sc.(Tech.) F.I.C. Dr. Knecht showed that if acetyl silk was immersed in a bath containing dioxytartaric acid and phenylhydrazine in presence of hydrochloric acid, the insoluble tartrazine which resulted was formed quantitatively on and in the fibre, which was dyed a particularly pure shade of yellow. By substituting paranitrophenylhydrazine for the phenylhydrazine an orange resulted. Similarly acetyl silk immersed in a bath containing nitrosamine, toluylenediamine, and acetic acid was dyed a rich terra-cotta shade. Incidentally, it was pointed out that a tartaric acid solution, which had stood for some time in contact with the air, contained dioxytartaric acid.

Russia's Dye Industry

The Russian dye industry is showing steady progress, especially in the manufacture of intermediates. The production of azo dyes during 1923-24 has been made possible by the manufacture of a variety of new intermediates such as beta-naphthol, H-acid, R-salt, etc. Phenol is at present produced for home use and its export is prohibited. At present Russia lacks sufficient quantities of coal-tar products to manufacture all the intermediates necessary to meet the large dye requirements of home industries.

The demand for dyes will be greatly increased this year, and it is anticipated that America will consider the Russian market as an outlet for large quantities of intermediates and dyestuffs. Competition will be experienced from Germany.

Steam Accumulation Methods

A Joint Meeting at Bristol

THE Bristol Section of the Society of Chemical Industry held the fourth meeting of the current session, jointly with the Institute of Chemistry, at the University last week. Mr. M. W. Jones presided, and a paper on "Steam Accumulation" was read by Mr. STANLEY HOPKINS, of Ruths Steam Accumulator Co.

MR. HOPKINS showed that the modern method of steam accumulation relied upon the property of hot water to absorb steam under rising pressure and discharge it under falling pressure. It provided for the introduction into the steam system of a works a sufficiently large thermal storage intimately co-operating with the steam in order to absorb all the variations in the steam consumption, so that the boilers, irrespective of heavy and variable demand from the factory, could be operated at a constant and steady rate. The various forms of steam accumulators on the market were discussed, such as the Rateau, which could only work at very low pressures, and is used principally in connection with colliery winding; the Balcke, which was simply a storage tank of the gasholder type; and the Ruths system, which was now being installed in a great number of technical works.

The lecturer stated that the degree of fluctuations of boiler load was not fully appreciated, and by means of a number of steam curves from typical works indicated that large economies could be effected. The method of operating the Ruths system was to take steam which was available during the low consumption period, and store, and deliver it against the demands of the high consumption or peak periods. The advantages to be gained were important, a large fuel economy was secured and almost invariably an increase in production. The saving in fuel varied with the type of factory, and had been as high as 30 per cent., and the increased production in one case was 100 per cent. Smoke abatement, cutting out of electric storage batteries, the use of high pressure boilers, and the possibility of meeting fluctuating load were all points in favour of the system. Complete equalisation of the boiler load had frequently resulted in a 30 per cent. reduction of boiler heating surface.

An American on Synthetic Ammonia

DR. RICHARD MOLDENKE, of Watchung, New Jersey, an American metallurgist and chemist, was a passenger on the Cunard liner *Aurania*, which left Liverpool for Boston on Thursday, January 15. He had been to Europe to investigate the progress of the manufacture of synthetic ammonia and nitrate.

The synthetic ammonia, which was used largely during the war in the manufacture of ammunition, was, he said, now being used extensively in the manufacture of fertilisers. From Germany's biggest chemical works the output was enormous. They turned out a 375 lb. bag of synthetic ammonia every minute and a quarter a day. At the same works they turned out 1,000 tons of synthetic nitrate a day.

It was his opinion that Germany would come back to normal through her chemicals. Commercial men in Germany were very optimistic at the present moment, and thought they were on the road to prosperity. Dr. Moldenke was in Germany last year during that country's worst period of depression. From what he had seen now he thought the Dawes settlement had wrought a great change in conditions in Germany. Dr. Moldenke, who has also been to Ireland, where he addressed the Engineering and Scientific Association in Dublin, said that the only thing Ireland required now was for her people to get confidence in themselves. In Sheffield he discussed with steel manufacturers the progress of the methods of testing iron and steel, respectively, in Great Britain and America. The impression he gained was that America worked more for tonnage whilst Great Britain worked more for quality.

New Zealand's Dye Needs

NEW ZEALAND is dependent for her dyestuffs entirely on imports, according to an American Consular report. Most of the dyestuffs come from Great Britain, whose trade is thoroughly protected by Australian tariff regulations. Textile mills are the chief dye consuming industry of the Dominion. There are twelve textile mills. There are only two paper mills in the Dominion, but their demand for dyestuffs is increasing. German dye firms predominate in this field on account of the expert technical service they furnish. The leather industry is scattered among a number of small firms which show little tendency to expand. They use a number of dyestuffs, most of which are furnished at present by European producers. British dye agents in Australia do a large business in New Zealand. The total value of dyestuffs consumed in 1923 was $73,799.

The "Yadil" Action Dismissed

IT is understood that the action for libel begun in July last by the proprietors of Yadil against the *Daily Mail*, Sir William Pope, and Professor Dixon has been dismissed in the High Court of Justice, with costs to be paid by the proprietors of Yadil. The proprietors of Yadil issued a writ following the publication of articles by Sir Wm. Pope and Professor Dixon, but never followed it up with the necessary statement of claim, and after pleas for more time, which were granted, Yadil failed to appear. Then application was made to have the action dismissed for want of prosecution. Accordingly an order was made in the High Court dismissing the action, subject to four more days' grace, which finally expired on January 17.

Debenture Holders' Meeting

Debenture holders in Clement and Johnson, Limited, proprietors of Yadil, met at Anderton's Hotel, London, on Tuesday, and after a discussion, decided to appoint a committee to consider a scheme for the reconstruction of the company. It was announced at the outset that an offer which had been made to take over the business had been withdrawn.

Mr. Forward, a debenture holder, was elected chairman of the meeting, and in answer to questions said the business was being carried on, and was showing signs of vitality.

Further questions were then asked, in the course of which it was alleged that pages had been torn from the books of the company and that there had been friction between the directors.

Mr. R. T. Matthews, a former director, declared that the books had "never been anything but a comic opera."

A resolution was passed urging that the formula should be placed in the possession of an official of the court, so that it should become accessible to any eligible and authorised person.

Chemical Engineering Catalogues

WE have received from S. Bornett and Co., Ltd., of 7 and 8, Idol Lane, London, E.C.3, who have recently been appointed sole agents for the Buffalo Foundry and Machine Co., in this country, a number of catalogues and descriptive pamphlets issued by the latter firm. The trade mark "Buffalovak" has been adopted for the various types of chemical engineering plant manufactured by this concern. Perusal of the catalogues indicates that evaporators and driers are a particular speciality and types are available for almost every conceivable purpose and condition, whether for low or high temperature, or in the open or under vacuum. Plant is also manufactured for distillations, sugar refining and many other processes. Vacuum pumps and other accessories are of course, also covered. One catalogue gives a full description of the "Buffalovak" inclined rapid circulation evaporator, which is a vacuum tube evaporator suitable for concentrating the most delicate liquids. A number of data tables add to the value of this particular catalogue (No. 213). The same catalogue also gives full particulars of other types of evaporators.

A Mixed Fertiliser

WE have received from the Stockton-on-Tees Chemical Works, Ltd., Bowesfield Lane, Stockton-on-Tees, pamphlets relating to, and samples of, their N.P.K. fertiliser manufactured by Mr. E. Lloyd Pease's process. The advantages claimed include great saving in cartage and handling as it is one-fourth the usual weight, solubility in water of phosphate content, and the fact that it is always dry and powdery. An analysis of a ton of the mixture gives the following percentages:—Water-soluble phosphate, 42 per cent., P_2O_5; nitrogen, 16·5 per cent. N.; humus, 20·0 per cent.; waste material in H^3PO^4 and in ammonia NH^3 (being mainly combined water), 21·5 per cent.

From Week to Week

SIR WILLIAM BRAGG has been elected to deliver the Romanes Lecture at Oxford this year.

FOUR FATAL ACCIDENTS are recorded in the chemicals, etc., industry during December, and six in the clay, stone, glass, etc., industries.

MR. W. J. COURTAULD, director of Courtaulds, Ltd., has given £2,000 to the Braintree (Essex) Public Library for the purchase of new books.

MR. CARL DELLWIK, prominently associated at the beginning of the present century with his process for the manufacture of water-gas, has died.

THE DISSOLVED ACETYLENE PROCESS OF WELDING was demonstrated by C. Geddes and Co. and Allen-Liversidge, Ltd., at Liverpool on Saturday, January 17.

A FINE OF 40S. was imposed on the Hillcrest Oil Co. (Bradford), Ltd., of Manchester, on Wednesday for causing a nuisance due to smells arising from the steam heating of oils and greases.

GERMANY'S EXPORTS during November showed increases as compared with the previous month in the case of colours and dyestuffs (by 8 million R.mks.), sulphate of potash, and other chemical products.

LORD LEVERHULME will have visited some 300 factories at the completion of his present West African tour. Jos and the Bauchi Plateau are to be visited, the latter being the centre of the valuable tin fields of Nigeria. Lord Leverhulme is expected to arrive at Southampton about March 30.

MR. W. A. WALMSLEY, manager of the chemical works attached to the four Glasgow Corporation Gasworks, has intimated his resignation from the service on appointment as managing director of Thomas Ness (Limited), chemical manufacturers, Darlington. Mr. Walmsley, who was appointed to his present position in April, 1919, begins his new duties on March 1.

"PULVERISED COAL" was the subject of a paper read by Mr. R. Jackson before the Manchester Association of Engineers on January 16. Mr. Jackson discussed the technical aspects of the prevention of smoke by the pulverising of fuel, reviewed experiments in France, America, and this country, and described the mills which form the modern types of pulverisers.

A PRESENTATION of a roll-top desk has been made by officials and staff of the Consett and Templetown Coke Works to Mr. T. Johnson, who for the last few months has been manager at the Templetown Coke Works, and was previously at Langley Park By-product Works and the Consett Fell Coke Works. Mr. Johnson will have entire charge, when it is completed, of the large by-product plant of Guest, Keen and Nettlefold at Dowlais, Glamorganshire.

UNDER A WINDING UP ORDER against Premier Products, Ltd., paint and oil producers, of 20, Grosvenor Gardens, London, a meeting of creditors and shareholders was held on Tuesday. The company handled a specialanti-fouling paint. manufactured from tar by the Midlands Coal Products, Ltd The latter company afterwards refused further deliveries unless payment was made in advance. The meeting resulted in the liquidation being left in the hands of the Official Receiver

LECTURING ON RADIOLOGICAL RESEARCH at the Royal Society of Arts on Monday, Mr. V. E. Pullin, Director of the Radiological Research Department, Woolwich, said that X-rays might be regarded as constituting a light of such curious illuminating power that one might study with the greatest clarity the structure of any sort of atom, which meant the very nature of all elements. The intimate investigation of the atom, and therefore of matter itself, was really a product of radiological research.

THE TOTAL SALE OF COAL TAR DYES of United States origin for the first nine months of 1923 was about 64,500,000 lb., valued at $36,500,000, while the total sale for the first nine months of 1924 was about 47,200,000 lb. valued at $24,300,000. Sales by quantity for the first nine months of 1924 represent a 27 per cent. decline from those of 1923, while by value the reduction was 33 per cent. The principal reason given by the dye manufacturers for changes in the volume of sales during 1924 compared with those of 1923, was the reduction in the activity of the textile and other dye-consuming industries.

A LECTURESHIP IN CLINICAL CHEMISTRY is to be instituted by Aberdeen University.

AN INCREASE OF 20 PER CENT. IN WAGES for the Berlin iron and engineering industries has been agreed.

"NO TARIFF TINKERING" is to be a feature of President Coolidge's four years in office, according to American reports.

A CARBOY OF NITRIC ACID exploded on the premises of a Newcastle engraver on Tuesday and an apprentice was seriously burned.

FOR FIGHTING PETROL FIRES the London Fire Brigade has now been equipped with a petrol-electric apparatus for carrying "foam" in bulk. The cost is estimated at £1,750.

IMPORTS OF ANILINE DYES INTO CHINA during the third quarter of 1924 totalled 120,033 H.taels compared with 67,273 H.taels in the corresponding period of 1923.

HERBERT GREEN AND CO., LTD., manufacturers of industrial alcohol and allied chemicals, have removed from 83, Pall Mall, to larger premises at 50, Pall Mall, London, S.W.1.

SIR ERNEST J. P. BENN will address the Birmingham Business Club at the Queen's Hotel, on Monday, February 9, at 7 p.m., on the subject of "Business and Politics."

"THE ROMANCE OF METALLURGY" is the subject of four lectures to be delivered by Professor F. C. Thompson in the Chemistry Lecture Room at the University of Manchester.

TAR FOR ROAD DRESSING at 8¼d. per gallon for between 70,000 and 80,000 gallons, or 8d. per gallon if the quantity exceeds 80,000 gallons is to be purchased by Colchester Town Council from the local gas company.

CHEMICAL TRADE DISPUTES during 1924 numbered 14, involving 1,000 workers and resulting in an agregate loss of 23,000 working days. The corresponding figures for 1923 give 14 disputes, 2,000 workers involved, and 27,000 days lost.

DISEASES OF OCCUPATIONS recorded during December included: Arsenic poisoning, 1; epitheliomatous ulceration, 12 (pitch 1, tar 1, oil 10); chrome ulceration—3 in the dyeing and finishing industry, and 3 in the chrome tanning industry.

SIR H. O. BAX-IRONSIDE is resigning the Chairmanship of Benzol and By-Products, Ltd., of Grosvenor Place, London, and Mitcham. Sir A. H. McMahon, the Egyptian Government's representative of the Anglo-Egyptian Oilfields, Ltd., has been appointed to the post.

DR. WALTER MAKOWER, who was lately chief physicist to the Dunlop Rubber Co., and for many years lecturer in physics to Manchester University, has been appointed Professor of Science at the Royal Military Academy in succession to Professor J. Young, O.B.E., retired.

UNEMPLOYED INSURED CHEMICAL WORKERS totalled 8,999 in December. Of this number 1,485 were women. In the explosives industry 1,311 men and 357 women of the insured workers were unemployed. In both instances there is no appreciable change compared with the previous month.

THE FORMATION IS ANNOUNCED of the British Portland Cement Association, with offices at 20, Dartmouth Street, Westminster. Its director is Brigadier-General A. C. Critchley, C.M.G., D.S.O., and its object to bring before the public a fuller appreciation of the uses of British Portland cement.

"VENUS" COPYING PENCILS, which have a reputation for consistent efficiency, are now reduced in price to 3d. each. Samples have been received from Alpco Pencils, Ltd., of 173 and 175, Lower Clapton Road, London, E.5, which firm is general agent for the products of the American Lead Pencil Co. of New York.

THE BRITISH COMMERCIAL SECRETARY AT RIO DE JANEIRO will attend at the Department of Overseas Trade for a few days beginning on January 26, for the purpose of interviewing British manufacturers and merchants interested in export trade to Brazil. Interviews can be given by appointment, and all applications should be addressed to the Comptroller-General, D.O.T., 35, Old Queen Street, London, S.W.1. (Reference 5609/T.G.)

AN ASSISTANT AGRICULTURAL CHEMIST is wanted for the Division of Research, Lands and Forests Department, Sierra Leone. Candidates must hold an honours degree in natural science (chemistry being the principal subject), or associateship of the Institute of Chemistry, and a diploma in agriculture. Further particulars and the form of application are obtainable from the Private Secretary (Appointments), Colonial Office, Downing Street, S.W.1.

References to Current Literature

British

CRYSTALLOGRAPHY.—The development and formation of crystals. T. V. Barker. *J.S.C.I.*, January 16, 1925, pp. 19–27T.

PAINTS.—Protective paint coatings. J. N. Tervet. *J.S.C.I.*, January 16, 1925, pp. 28–30T.

ANALYSIS.—A delicate method of detecting cobalt occurring separately or in presence of nickel and other salts in neutral solution. S. J. Jindal. *Chem. News*, January 16, 1925, pp. 34–35.

A colour test for aniline and toluidine. H. D. Murray. *Chem. News*, January 9, 1925, p. 23.

Gasometric determinations by means of combustion with copper oxide. Part I. J. Sveda. *Chem. News*, January 2, 1925, pp. 1–5.

The sampling of gases. J. H. Goldsmith. *Gas World*, January 3, 1925, pp. 7–9.

PHYSICAL.—Influence of pressure on the freezing point of *p*-nitrotoluene, *m*-dinitrobenzene, and guaiacol. N. A. Pushin. *Chem. Soc. Trans.*, December, 1924, pp. 2628–2629.

ORGANIC SULPHIDES.—Studies in organic polysulphides. Part III. The action of the disulphides of the alkali metals and of sodium tetrasulphide on some organic halogen compounds. J. S. Thomas and R. W. Riding. *Chem. Soc. Trans.*, December, 1924, pp. 2460–2467.

XYLENES.—Extraction of isomeric xylenes from crude xylol. T. S. Patterson, A. McMillan, and R. Somerville. *Chem. Soc. Trans.*, December, 1924, pp. 2488–2490.

CARBAZOLES.—A new method for the preparation of 9-alkyl carbazoles. H. Burton and C. S. Gibson. *Chem. Soc. Trans.*, December, 1924, pp. 2501–2504.

DRUGS.—Isomeric benzoyl derivatives from vinyl-diacetonamine. F. S. Kipping and T. Greasley. *Chem. Soc. Trans.*, December, 1924, pp. 2611–2615.

United States

CARBON.—Adsorbent carbon for many industries. R. H. McKee and P. M. Horton. *Chem. and Met. Eng.*, January 5, 1925, pp. 13–17.

Some observations on the transition of coal to coke. E. Sinkinson. *J. Ind. Eng. Chem.*, January, 1925, pp. 27–31.

COLLOIDS.—Density and hydration in gelatine sols and gels. T. Svedberg. *J. Amer. Chem. Soc.*, December, 1924, pp. 2673–2676.

The ultracentrifuge. A new instrument for the determination of size and distribution of size of particle in a microscopic colloids. T. Svedberg. *J. Amer. Chem. Soc.*, December, 1924, pp. 2677–2692.

A new method for the determination of the distribution of size of particles in emulsions. E. O. Kraemer and A. J. Stamm. *J. Amer. Chem. Soc.*, December, 1924, pp. 2709–2717.

Measurements of the mobility of egg albumin at different acidities. N. D. Scott and T. Svedberg. *J. Amer. Chem. Soc.*, December, 1924, pp. 2700–2706.

ANALYSIS.—Mohr's method for the determination of silver and halogens in other than neutral solutions. H. W. Doughty. *J. Amer. Chem. Soc.*, December, 1924, pp. 2707–2708.

The use of iron or nickel crucibles for alkali determinations. A. W. Epperson and R. B. Rudy. *J. Ind. Eng. Chem.*, January, 1925, pp. 35–36.

Determination of aniline in aqueous solutions. C. M. Carson. *J. Ind. Eng. Chem.*, January, 1925, pp. 62–63.

Effect of some inorganic salts on the polarization of sugar solutions. R. J. Brown. *J. Ind. Eng. Chem.*, January, 1925, pp. 39–41.

OILS.—Reclamation of lubricating oil from used crankcase oil. F. H. Rhodes and H. J. Haon. *J. Ind. Eng. Chem.*, January, 1925, pp. 25–27.

The surface tension of crude oils. E. H. Harvey. *J. Ind. Eng. Chem.*, January, 1925, pp. 85–86.

Gas formation in the cracking process. G. Egloff and J. C. Morrell. *J. Ind. Eng. Chem.*, January, 1925, p. 32.

DYES.—The constitution of catechin. VII.—4 : 5 : 7 : 3′ : 4′-pentahydroxyflavan. M. Nierenstein. *J. Amer. Chem. Soc.*, December, 1924, pp. 2793–2797.

The constitution of catechin. VIII—α–3 : 5 : 3′ : 4′-pentahydroxy-4-benzyl-1 : 2-dihydrocoumarone. H. F. Dean and M. Nierenstein. *J. Amer. Chem. Soc.*, December, 1924, pp. 2798–2805.

The chemistry of furfural. The preparation of the furane analogue of benzoflavin or dimethyl-diaminofurylacridine hydrochloride. S. A. Mahood and C. R. Harris. *J. Amer. Chem. Soc.*, December, 1924, pp. 2810–2812.

The spectroscopic identification of dyes. W. C. Holmes, *J. Ind. Eng. Chem.*, January, 1925, pp. 59–60.

German

ANALYSIS.—The estimation of oxygen in lighting gas. G. Hofer and H. v. Wartenberg. *Z. angew. Chem.*, January 1, 1925, pp. 9–11.

ACIDS.—The hydrochloric acid industry and revolving furnaces for hydrochloric acid production. C. Ritter. *Chem. Apparatur*, December 10, 1924, pp. 181–184.

RUBBER.—Colloid problems and the rubber industry. P. Klein and P. Stamberger. *Kolloid Z.*, December, 1924, pp. 362-366.

The combination of rubber with water. F. Kirchhof. *Kolloid Z.*, December, 1924, pp. 367–374.

CATALYSIS.—Acceleration of the catalytic combination of hydrogen and oxygen by means of oxygen carriers and alternating current. K. A. Hofmann and A. Dolde. *Ber.*, December 3, 1924, pp. 1969–1976.

LITHIUM.—Study of the chemistry of lithium. III. Lithium hydride. G. F. Hüttig and A. Krajewski. *Z. anorg. u. allg. Chem.*, December 23, 1924, pp. 133–160.

The salt-forming properties of alkali alkyls in metal alkyls as solvents. E. Petzchener, K. Nagler and A. Segitz. *Z. anorg. u. allg. Chem.*, December 23, 1924, pp. 161–227.

RUTHENIUM.—The isomeric potassium pentachloro rutheniates. A. Gutbier and W. Nieman. *Z. anorg. u. allg. Chem.*, December 23, 1924, pp. 312–316.

RARE EARTHS.—The separation of zirconium and hafnium by crystallization of their ammonium double fluorides. The separation of zirconium from other metals, particularly hafnium, by fractional distillation. J. H. de Boer and A. E. van Arkel. *Z. anorg. u. allg. Chem.*, December 23, 1924, pp. 284–296.

Miscellaneous

REACTIONS.—The hydrolysis of orthocarbonic ethyl esters. A. Skrabal and M. Baltadschiewa. *Monats. fur Chem.*, October 15, 1924, pp. 95–104.

The saponification of ketocarboxylic esters. A. Skrabal, F. Pfaff, and H. Airoldi. *Monats. fur Chem.*, October 15, 1924, pp. 141–156.

The action of organic magnesium compounds on phthalonitrile. R. Weiss and E. Freund. *Monats. fur Chem.*, October 15, 1924, pp. 105–144.

The action of organic magnesium compounds on benzonitrile. E. Ectors. *Bull. Soc. Chim. Belg.*, November, 1924, pp. 521–524.

The action of organic magnesium compounds on ethyl cyanoformate. P. Bruylants. *Bull. Soc. Chim. Belg.*, November, 1924, pp. 529–531.

ELECTROLYSIS.—The electrolysis of molten metal alloys. Part III. The electrolysis of lead-cadmium and lead-sodium alloys. Part IV. The electrolysis of alloys of mercury with sodium, potassium, calcium and cadmium. R. Kremann. *Monats. fur Chem.*, October 15, 1924, pp. 133–140 and 157–177.

RADIOACTIVITY.—New radioactive minerals. A. Schoep. *Bull. Soc. Chim. Belg.*, November, 1924, pp. 525–529.

DRUGS.—The crystal form of some organic derivatives of arsenic, potassium, lithium, and ammonium *p*-aminophenylarsinates. G. Gilta. *Bull. Soc. Chim. Belg.*, November, 1924, pp. 532–538.

Patent Literature

Abstracts of Complete Specifications

226,248. ACETIC ACID, ACETALDEHYDE OR ACETONE OR MIXTURES CONTAINING THE SAME, MANUFACTURE OF. H. Dreyfus, 8, Waterloo Place, London, S.W.1. Application date, June 22, 1923.

A mixture containing methane and carbon dioxide or carbon monoxide is passed under pressure at a temperature of 100° to 500° C. over a catalyst such as copper, iron, nickel, cobalt, palladium, platinum, palladium black, or platinum black, or nickel carbonate. The carbon dioxide and monoxide are in excess relatively to the methane, and the catalytic material may be deposited on porous material or otherwise finely divided, or the reaction tube may be composed of the catalytic material. In an example, a mixture of methane with an excess of 10 to 20 per cent. of carbon monoxide over that theoretically necessary for the production of acetaldehyde is passed at a pressure of 12 to 50 atmospheres and temperature of 150° to 300° C. through pipes containing finely divided nickel and nickel carbonate. The gaseous products are treated for the extraction of acetaldehyde and other aliphatic compounds, and the residue of methane and carbon monoxide is passed back to the reaction chamber. In some cases, the nickel carbonate may be associated with sodium carbonate.

226,263. SULPHURIC ACID, MANUFACTURE OF. A Keller, Eilenau 15, Hamburg, Germany. Application date, September 6, 1923.

The process is for the manufacture of chamber acid of 60 to 75 per cent. strength. The acid contained in the bottom of the chamber is sprayed into the chamber by means of a turbine sprayer rotating on a vertical axis. The turbine sprayer is arranged near the centre of the chamber, and serves to raise and also spray the acid. The same method may be employed for spraying the acid in an empty Gay-Lussac tower. Reference is directed in pursuance of Section 8, Sub-Section 2, of the Patents and Designs Acts of 1907 and 1919 to Specification No. 216,192.

226,309. CELLULOSE ACETATE, MANUFACTURE OF. L. A. Levy, 31, Shootup Hill, Cricklewood, Middlesex. Application date, October 10, 1923.

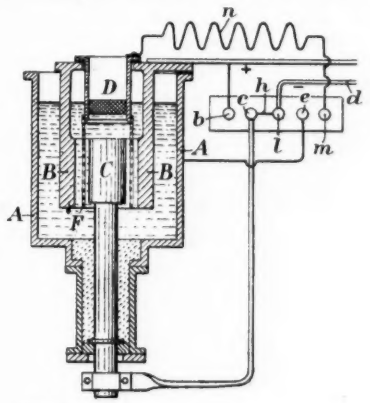
Cellulose acetate as usually manufactured is obtained in solution in acetic acid. The cellulose acetate is then precipitated and dissolved in a suitable solvent for extrusion in the form of fine filaments. This precipitation and re-solution is rendered necessary owing to the fact that dry spinning or semi-dry spinning the acetic acid solution is not possible owing to the high boiling point of this acid. In this invention, the solvent employed in the acetylating bath is ethyl formate, methyl acetate, or other solvent having a boiling point below 60° C. The cellulose is treated with acetic acid and a little anhydride and sulphuric acid to effect a partial hydrolysis. The cellulose is then treated with acetic anhydride and a catalyst such as sulphuric acid in the presence of ethyl formate or methyl acetate to obtain a solution of cellulose acetate. Suitable precipitating or neutralising agents may then be added to remove the catalyst and any excess of acetic anhydride or acetic acid.

226,337. DETERGENT. H. Noble, 25, Victoria Road, Scarborough. Application date, August 6, 1924.

A detergent compound is made by heating soap flakes and then adding in succession pearl ash, mineral naphtha, and methylated spirit, with or without salts of tartar.

226,349. SODIUM, PREPARATION OF. P. L. Hulin, 6, Rue Félix-Poulat, Grenoble, Isère, France. Application date, November 20, 1923.

In the production of sodium by the electrolysis of soda, the yield rapidly diminishes when the temperature of the bath rises, and it is therefore necessary to keep the temperature not much above the melting point of soda. If the temperature is too high, the electrolysis becomes irregular, and it has been found that this is due to the fact that the sodium becomes detached from the cathode and is dispersed in the bath in finely divided particles. This dispersed sodium reacts with the OH component of the electrolyte to form sodium hydroxide, giving off at the same time a considerable amount of heat. In this invention, the irregular working is avoided by periodically bringing about a superficial oxidation of the cathode by causing it to act as an anode for a limited time under the action of a very small amount of electricity. This can be effected by reversing the direction of the current between the



226,349

anode of iron or nickel and the copper cathode, for about 2 to 10 seconds. Alternatively, a part only of the electrolysing current may be reversed or the cathode may act as an anode to one or more auxiliary cathodes.

The illustration shows the application to the Castner apparatus. The vat A is caused to act as the auxiliary cathode by connecting it to the branch *d* of the circuit by connecting the terminals *e*, *l*. A contact *m* and variable resistance *n* are provided, connected to the receiver D, and by the latter to a wire gauze diaphragm F. To effect the oxidation of the cathode C, the vat A and the receiver D are both connected to the point *l*. The connection *h* is removed, and the points *b*, *c* are connected. The main current then passes from B to A, and a fraction passes from B to F and D. The reduced current which effects the cathodic oxidation is controlled by the resistance *n* and passes from F to C, D and A. Several methods of effecting this superficial oxidation are described.

226,364. GAS PURIFIERS. C. S. Floyd, 59, Barnardo Road, Exeter. Application date, December 14, 1923.

The object is to improve gas purifiers of the box type to eliminate undesirable effects from the expansion of the

226,364

absorbent due to the absorption of impurities. The grids *b* which carry the absorbent *d* are supported on annular shelves *c* around the sides of the gas purifier. The absorbent *d* does not reach the sides of the purifier, a space *e* being left for expansion. The shelves *c* are not perforated, so that the gas is compelled to pass through the absorbent.

226,373. VAT DYESTUFFS, MANUFACTURE OF. O. Y. Imray, London. From Society of Chemical Industry in Basle, Switzerland. Application date, December 29, 1923.

These dyestuffs are obtained by treating a nucleal halogen substitution product of 2 : 3-naphthioindoxyl with an oxidising agent. These halogen substitution products are obtained according to the process described in Specification No. 216,347 (See THE CHEMICAL AGE, Vol. X, p. 680). In an example, 1-bromo-2 : 3-naphthioindoxyl or 1-chloro-2 : 3-naphthioindoxyl is dissolved in caustic soda lye of 5 per cent. strength, and oxidised with a current of air at 70° to 80° C. The separated dyestuff is filtered, washed, and dried, and is a violet-blue powder dissolving in sulphuric acid monohydrate to a

green solution; it yields with hydrosulphite and caustic soda lye an olive brown vat which dyes cotton blue.

226,391. Hydrogen Peroxide, Production of. R. Wolffenstein, 7, Luciustrasse, Berlin-Grünewald, and V. Makow, of La Société d'Electro-chimie, St. Michel, Savoy, France. Application date, February 2, 1924.

In the production of persulphuric acid or persulphates by the electrolysis of sulphuric acid or sulphates for the subsequent manufacture of hydrogen peroxide, it is found that the current is not entirely utilised and that catalysts or impurities from the electrodes pass into solution. These difficulties can be avoided if small quantities of organic compounds of high molecular weight are added to the solution. Such compounds include protective colloids such as gelatine, gums, casein, dextrin, and the like. In an example, an addition of 0·5 per cent. of gelatine or gum arabic to the electrolyte acts to increase the potential and prevents impurities from the electrode materials from decomposing the solution under treatment.

226,440. Concentrated Rubber Latex and Rubber from Rubber Latex, Production of. I. Traube, 29, Scholssstrasse, Charlottenburg 5, Germany. Application date, May 29, 1924.

It has been found that rubber latex can be separated into two layers, one containing a large and the other a small proportion of rubber by the addition of a small proportion of vegetable or animal colloid materials such as Caragheen moss, Iceland moss or gelatine. Coagulation of the latex does not occur, and the separation into layers may be made more rapid by raising the temperature. Other colloidal substances such as gelatinised mucilage, glue, gelatine jelly, and the like, may also be used. The process may also be used to obtain rubber from the latex. The latter, which may be concentrated as above, is brought on to the surface of a concentrated aqueous colloid, and a layer of rubber is obtained on the surface of the colloid. The colloid may be mixed with glycerine, molasses, or other substances adapted to withdraw water from the latex. In an example, 100 litres of latex is treated with the extract made by heating 140 grams of Caragheen moss with 14 litres of water. The mixture is heated to 50° to 60° C. and allowed to stand, when it separates into two layers, the upper of which contains practically all the rubber. This concentrated latex may be mixed with a filler, such as chalk, and the mixture dried by application to a surface as described, and subsequently vulcanised.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age, when they became open to inspection under the International Convention: 202,639 (R. Adler) relating to a process for increasing the porosity of decolorising charcoal, see Vol IX, p. 465; 202,651 (Chemische Fabrik Ambra Akt.-Ges.) relating to manufacture of products from urea and formaldehyde, see Vol. IX, p. 465; 211,120 and 219,280 (Society of Chemical Industry in Basle) relating to manufacture of indigoid dyestuffs, see Vol. X, p. 391, and Vol. XI, p. 299.

International Specifications not yet Accepted

224,849. Synthetic Drugs. Soc. Anon. des Etablissements Poulenc Frères, 82, Rue Vieille-du-Temple, Paris, E. Fourneau, 7, Rue Barbet de Jouy, Paris, and J. Trefouel, 22, Rue Dutout, Paris. International Convention date, November 14, 1923.

m-nitro-*p*-methylbenzoyl chloride is condensed with 1-naphthylamine-4 : 6 : 8-trisulphonate of sodium, the nitro group reduced, and the aminomethylbenzoyl compound condensed with *m*-nitrobenzoyl chloride. The product is again reduced and condensed with phosgene, yielding urea of *m*-amino-benzoyl-*m*-amino-*p*-methylbenzoyl-1-naphthylamine-4 : 6 : 8-trisulphonic acid.

224,863. Purifying Coke Oven Gases. L'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude, 48, Rue St. Lazare, Paris. International Convention date, November 17, 1923.

Coke oven gases are first treated by known methods for the removal of solid and liquid impurities, hydrocarbons such as benzene and toluene, hydrogen sulphide, and most of the carbon dioxide. The gases are then treated with a solution of caustic soda and glycerine to remove traces of carbon dioxide and carbon oxysulphide. The gases are then treated with sulphuric acid containing a catalyst such as tungstic or vanadic acid, which removes moisture, traces of ammonia and part of the ethylene. Any trace of acid is then removed by passing over solid soda, and the gases are then ready for separation by liquefaction.

224,869. Splitting Fats, Oils and Waxes. J. D. Riedel Akt.-Ges., 1, Riedelstrasse, Britz, Berlin. International Convention date, November 14, 1923.

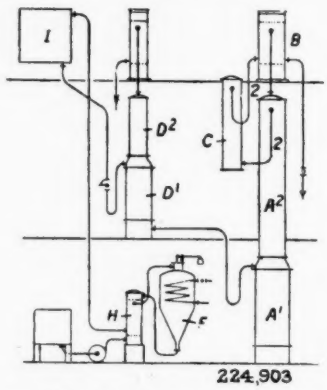
Splitting agents for use in the Twitchell process consist of sulphonic acids of aromatic hydrocarbons having one or more radicals substituted in the nucleus. Derivatives such as acid chlorides may also be used. Suitable radicals are alkyl, aryl, and aralkyl, alicyclic, oxalkyl or other residues containing non-acid substituents. Examples are given of the splitting of fats with 0·5-0·6 per cent. of cyclohexylnaphthene sulphonic acid, dimethyl-tetrahydro-naphthalene sulphonic acid, octo-hydro-anthracene sulphonic acid, mono- or poly-alkylated naphthalene sulphonic acid, or their salts or functional derivatives.

224,901. Lubricating Oils. Deutsche Petroleum Akt.-Ges., 43, Hardenbergstrasse, Charlottenburg, Berlin (Assignees of Fischmann and Franke, Glauchau, Germany). International Convention date, November 17, 1923.

Oils obtained by low temperature carbonisation, or mineral or tar oils of high boiling-point, are distilled with superheated steam under reduced pressure in the presence of purifying agents such as oxides of barium, calcium and aluminium, hydroxides or carbonates of alkalis, barium or calcium, hydroxide of aluminium, and salts of metal acids such as sodium ferrite, aluminate or ferri-aluminate.

224,903. Distilling Plant. C. Mariller and L. Granger, 38, Rue des Peupliers, Paris. International Convention date, November 12, 1923.

Alcohol is purified by heating under pressure with alkali in a vessel *F* to decompose esters, and the vapour is condensed in a heat exchanger *H*, and passed through a vessel *I* to a



224,903

purifying column D^1, D^2. Volatile impurities are separated in this column, and the alcohol passes to a rectifying column A^1, A^2. The vapour passes to a condenser *B*, which discharges part of the condensate through a pipe 1, while part passes through a pipe 2 to a vessel *C* containing calcium chloride or potassium acetate to dehydrate it. The mixture then passes back to the top of the rectifying column.

224,907. Distilling Shale or Coal. G. Gröndal, Djursholm, Sweden, and L. Carlson, 4, Wahrendorffsgatan, Stockholm. International Convention date, November 13, 1923.

Bituminous material in powder or small pieces is fed through a heated retort supported on trays. The material is first dried and heated rapidly to 400° C., and then passed through zones of increasing temperature to a chamber where the residue is cooled with water.

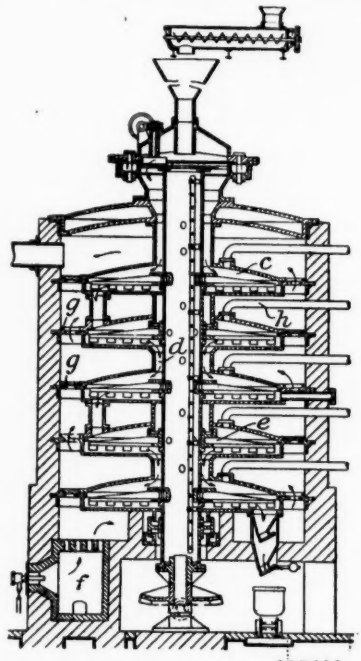
224,913. Alkyl Resorcinols. Sharp and Dohme, Inc., 307, West Pratt Street, Baltimore, Md., U.S.A. (Assignees of A. R. L. Dohme, 307, West Pratt Street, Baltimore, Md., U.S.A.). International Convention date, July 31, 1923.

To obtain *n*-propyl and *n*-butyl resorcinols, resorcinol is heated with propronic or *n*-butyric acid and a condensing agent such as zinc chloride. The intermediate ketone is

separated and purified, reduced by zinc amalgam and hydrochloric acid, and the resulting *n*-propyl or *n*-butyl resorcinol purified by vacuum distillation.

225,168. CARBONISING BITUMINOUS MATERIALS. G. Verouert, 15, Dorotheenstrasse, Gelsenkirchen, Germany, and G. Rieber, 38, Hammerschmidtstrasse, Gelsenkirchen, Germany. International Convention date, November 19, 1923.

Material to be distilled is passed downwards through a series of chambers *c* each having a rotary rabble *e* to agitate the material and transfer it from the centre to the periphery



225,168

and vice versa. Connecting passages *d* are provided at the centre and periphery, and the chambers are heated by hot gases which pass upwards around them from a chamber *f*. Openings for the heating gases are provided in the discs *g* alternately at opposite sides.

225,172. LOW TEMPERATURE CARBONISATION. Kohlenscheidungs-Ges., 100, Friedrichstrasse, Berlin. International Convention date, November 24, 1923.

Bituminous fuel is fed into a hozizontal rotary drum which is externally heated to about 400° C. The fuel becomes soft at this temperature, and is then discharged into a stationary retort which is externally heated to a higher temperature. Movement of the material is thus avoided at the stage when it becomes solid and brittle, and dust is not formed. The volatile products are drawn off between the two retorts.

225,174. REDUCING HALOGEN HYDROCARBONS. Soc. Chimique des Usines du Rhône, 21, Rue Jean-Goujon, Paris. International Convention date, November 21, 1923.

Halogenated hydrocarbons are reduced and the halogen atoms replaced with hydrogen by treating with ferrous hydroxide in the presence of water and a base. The ferrous hydroxide may be prepared *in situ* by electrolysis. The halogenated hydrocarbon is added to an aqueous solution of a neutral or basic salt and electrolysed with an iron anode. Alternatively, ferrous hydroxide may be made separately by electrolysis and added to the halogenated hydrocarbon and basic solution. In another alternative, a ferrous salt may be added to the halogenated hydrocarbon, and ferrous hydroxide precipitated by adding a base or basic salt. Chloroform may be obtained from carbon tetrachloride by this process, and may be separated by distillation.

225,199. ALUMINIUM CHLORIDE, SULPHATE AND OXIDE. C. Asseev, 66, Rue de l'Aulne, Uccle, Brussels. International Convention date, November 21, 1923.

Aluminium chloride is obtained by treating clay or bauxite with sulphuric acid, and saturating the solution with hydrochloric acid gas to precipitate the crystals. These are purified by washing with strong hydrochloric acid, dissolving in water, and reprecipitating with hydrochloric acid gas till free from iron. The sulphate may be obtained by treating the chloride with sulphuric acid, and the oxide by heating to 300° C. The hydrochloric acid gas evolved may be used for the preparation of further quantities of chloride. The wash liquors containing hydrochloric and sulphuric acids are concentrated till the hydrochloric acid is expelled, and the remaining sulphuric acid is cooled to crystallise ferric sulphate.

[LATEST NOTIFICATIONS.

227,440. Process for the manufacture of trisazo dyestuffs. Fabrique de Produits Chimiques ci-devant Sandoz. January 11, 1924.

227,468. Manufacture of artificial resinous and like compositions. Regal and Co., Novak, J., and Kostal, J. January 12, 1924.

227,474. Method of recovering oils from cod liver and similar materials. Hansen, D. A. January 11, 1924.

227,475. Process of producing methyl alcohol and methylene chloride from methane. Goldschmidt Akt.-Ges., T. January 10, 1924.

Specifications Accepted with Date of Application

205,081. Silicic acid gels, Manufacture of. Farbenfabriken vorm. F. Bayer and Co. October 4, 1922.

210,091. Grey cast iron, Manufacture of. H. Lanz (Firm of). January 22, 1923.

218,972. Zinc chloride solutions, Process for obtaining products suitable for metallurgical treatment from. A. Nathansohn. July 9, 1923.

226,940. Holders for chemical apparatus and the like. A. Hossack. November 22, 1923.

226,948. Dyeing cellulose acetate with water-soluble sulphonated dyestuffs. British Dyestuffs Corporation, Ltd., and G. H. Frank. November 30, 1923.

227,022. Electrical precipitation of suspended articles from gaseous fluids, Process of and apparatus for. Lodge Cottrell, Ltd. (*International Precipitation Co., Inc.*). April 3, 1924.

227,026. Furnaces. J. Norbeck. April 9, 1924.

227,039. Hydrogen sulphide in illuminating and other gas, Apparatus for the quantitative determintaion of. Humphreys and Glasgow, Ltd. (*W. H. Fullweiler.*) May 12, 1924.

222,136. Benzyl resorcinol, Process of preparing. H. Hirzel. September 19, 1923.

227,069. Wet magnetic separation treatment of ores and other mixtures of materials. P. C. Rushen. (*F. Krupp Grusonwerk Akt.-Ges.*) September 8, 1924.

Applications for Patents

(Chemische Fabrik auf Actien vorm. E. Schering). Manufacture of quinoline-4-aldehyde and its 2-position aryl derivatives. 1,080. January 13.

Colloisil Colour Co., Ltd., and Eberlein, W. Production of stable pigment colours. 1,387. January 16.

Colloisil Colour Co., Ltd., and Eberlein, W. Production of fillers for pigment colours, rubber, etc. 1,388. January 16.

Consortium für Elektrochemische Industrie Ges. Manufacture of condensation and polymerization products of acetylene. 1,508. January 17. (Germany, January 23, 1924.)

(Farbenfabriken vorm. F. Bayer and Co.). Sulphide dyes, etc. 976. January 12.

Farbenfabriken vorm. F. Bayer and Co. Manufacture of varnishes, etc. 1,171. January 14. (Germany, January 29, 1924.)

Ges. für Kohlentechnik. Production of sodium bicarbonate and sal ammoniac. 937. January 12. (Germany, February 21, 1924.)

Goldschmidt Akt.-Ges., T. Process of producing methyl alcohol and methylene chloride from methane. 971. January 12. (Germany, January 10, 1924)

Hansen, D. A. Method of recovering oils from cod liver, etc. 938. January 12. (Norway, January 11, 1924.)

Imray, O. Y. (Farbwerke vorm. Meister, Lucius, and Brüning). Manufacture of alkamine esters of N.-substituted Para-aminobenzoic acid. 1,314. January 15.

Kostal, J., Novak, J., and Regal and Co. Manufacture of artificial resinous, etc., compositions. 879. January 12. (Czecho-Slovakia, January 12, 1924.)

Lavaud, R. Dyeing artificial silk. 1,381. January 16. (Belgium, January 16, 1924.)

Lavaud, R. Fireproofing artificial silk. 1,382. January 16. (Belgium, January 16, 1924.)

Schotz, S. P. Emulsions of asphalt, etc. 1,010. January 13.

Soc. Anon. de Produits Chimiques de Droogenbosch. Manufacture of sulphuric acid. 1,100. January 14. (France, January 19, 1924.)

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firm's independent and impartial opinions.*

London, January 22, 1925.

THERE is a distinct improvement in the demand during the current week and quite a fair volume of business has been concluded. Prices continue steady with only one or two exceptions and the undertone is firm. Export demand has also improved, although a good deal of business still has to be referred back for revised limits.

General Chemicals

ACETONE continues quiet and without change in value at £85 per ton.

ACID ACETIC is a shade easier and price is barely steady at £41 for technical and £43 per ton for pure 80%. The reason for this is the small demand and the influence of one or two resale parcels which are on the market.

ACID CITRIC is firm and an advance is not unlikely.

ACID FORMIC is unchanged and in good request at £53 per ton.

ACID LACTIC is unchanged and an increase of business is being done at the current rate of £43 per ton for 50% by weight.

ACID OXALIC is fairly well called for and to-day's value is still 3¾d. per lb.

ACID TARTARIC has been more active especially for export, and supplies can be obtained at round about 11½d. per lb., less 5 per cent. for bulk quantities.

ALUMINA SULPHATE is steady and some fair business has been placed on the basis of £6 5s. per ton for 17/18%.

ARSENIC continues quiet, but there is a slight increase in the inquiry, price nominally £37 per ton.

BARIUM CHLORIDE is steady and moves briskly into consumption at £12 per ton.

COPPER SULPHATE continues fairly active and price is unchanged at £23 per ton. Continental competition is not so much in evidence.

CREAM OF TARTAR is slightly more active, but price is unchanged at £78 per ton.

EPSOM SALTS continues firm and price is without change.

FORMALDEHYDE is as weak as ever and demand poor, price nominally unchanged at £46 per ton.

LEAD ACETATE is firm at £49 per ton for white and £46 per ton for brown; the demand is active.

LEAD NITRATE is unchanged and is in strong demand at £43 per ton.

LIME ACETATE is steady and is offering to-day at £14 to £14 10s. per ton for grey.

POTASSIUM CARBONATE AND CAUSTIC.—Unchanged.

POTASSIUM PERMANGANATE.—Price is steady although some cheaper supplies can be obtained at round about 8½d. per lb.

POTASSIUM PRUSSIATE continues in active request at 7¾d. to 8d. per lb., and a substantial business has been done on forward account.

SODIUM ACETATE.—Demand is not so active, but the price is firm at £23 per ton.

SODIUM BICHROMATE.—Price unchanged at English makers' figures.

SODIUM HYPOSULPHITE is unchanged and a substantial business has been transacted for forward at these figures.

SODIUM PRUSSIATE continues active and the material is in much better request at 4½d. per lb.

SODIUM SULPHIDE is unchanged.

Coal Tar Products

The market generally for coal tar products remains firm, with little change since last week.

90% BENZOL is very scarce, at 1s. 8½d. to 1s. 9d. per gallon on rails.

PURE BENZOL remains unchanged, at 2s. per gallon on rails.

CREOSOTE OIL is very firm, and is worth 6¼d. to 6½d. per gallon on rails in the North, while in London the price is 7d. to 7¼d. per gallon.

CRESYLIC ACID shows no sign of improvement, and is worth 1s. 10d. per gallon on rails for the pale quality 97/99%, in bulk, while the dark quality 95/97% is still quoted at 1s. 7d. per gallon on rails.

SOLVENT NAPHTHA remains unchanged at 1s. 3½d. to 1s. 4d. per gallon on rails.

HEAVY NAPHTHA is quoted at 1s. 1d. per gallon on rails.

NAPHTHALENES.—The slight improvement reported last week has not been maintained, and there is no change to report. The drained qualities are worth from £4 10s. to £5 per ton, 76/78 quality from £6 to £6 10s. per ton, and 74/76 quality from £5 10s. to £6 per ton.

PITCH.—In the absence of demand from abroad the market is dull, and somewhat easier prices are being quoted. To-day's values are 50s. to 52s. 6d., f.o.b. London; 47. 6d. to 50s., f.o.b. East and West Coast ports.

Nitrogen Products Market

Export.—The market continues unchanged with the usual demand from several countries. As the demand absorbs the limited quantities the producers have now available for export, the price also remains unchanged. With regard to the United States, it is not expected that the importations to this country will be sufficient to have any effect on the market.

Home.—Home bookings for delivery February/May continue on the usual scale. The demand for prompt delivery has been affected adversely on account of the weather conditions, but it is anticipated that this demand will mature a little later.

Nitrate of Soda.—The market is still weak and the sales reported by the Producers' Association are very small. There have been no changes in price.

American Market Movements

(From *Drug and Chemical Markets.*)

MARKET for heavy chemicals remains quiet and prices are generally steady. Oxalic acid is higher, owing to increased duty. Prussiates continue firm. Copper sulphate is holding at advance. Barium salts unchanged. Arsenic continues dull. Sodium nitrate higher. Intermediates continue quiet. Ortho-nitrotoluene higher. Ortho-toluidine also advanced. Cleve's acid easier. Naphthionic acid lowered. Acid H down. Aniline oil steady. Dimethylaniline unsettled. Diethylaniline very firm. Crudes quiet but steady. Benzene unchanged. Phenol weak. Pyridine quiet.

Linseed oil higher for January–February. Chinawood oil steady. Cottonseed oil firm. Vegetable oils continue generally strong. Animal oils strong with makers sold up. Tallow firm. Degras unchanged. Oleo oil lowered. Stearic acid and red oil firm at advance. Fish oils in better request with quotations generally unchanged.

Fine chemicals are generally in small demand, although active business is reported in cod liver oil, mercury, and formaldehyde. Bay rum is quiet. Santonin is firm and active. Menthol is steady. Essential oils are firmly held, and few changes noted.

The Library of Capitalism

UNDER the title of "The Library of Capitalism," Jarrolds, Ltd., are issuing a series of popular monographs on the various aspects of the present economic situation. They aim at making a clear and concise statement of the anti-Socialist auguments and presenting economic problems in a lucid manner. The first volumes are "The Socialist Menace and the Way to Meet It," by W. W. Paine, General Manager of Lloyd's Bank, and "Prosperity and Politics," by Sir Ernest Benn.

Further volumes will be "Labour and Profits," by Boyd Cable, the well-known novelist, who has had wide experience of economic conditions in the capacity of trimmer, ship fireman and farm hand, and also in business; and "Sidelights on Industrial Evolution," by W. Vaughan Wilkins, who was for many years with the Central Council for Economic Information and with the Coal Association. The first two volumes will be ready immediately, and the others will follow shortly.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at retailers' works.

General Heavy Chemicals

Acid Acetic, 40% Tech.—£22 to £24 per ton.
Acid Boric, Commercial.—Crystal, £45 per ton, Powder, £47 per ton.
Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.
Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.
Acid Sulphuric.—Average National prices f.o r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.
Bleaching Powder.—Spot, £10 10s. d/d.; Contract, £10 d/d. 4 ton lots.
Bisulphite of Lime.—£7 10s. per ton, packages extra.
Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)
Calcium Chloride (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.
Copper Sulphate.—£25 to £25 10s. per ton.
Methylated Spirit 64 O.P.—Industrial, 2s. 7d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.
Nickel Sulphate.—£38 per ton d/d. Normal business.
Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.
Potash Caustic.—£30 to £33 per ton.
Potassium Bichromate.—5¾d. per lb.
Potassium Chlorate.—3d. to 4d. per lb.
Salammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.
Salt Cake.—£3 10s. per ton d/d. In bulk.
Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength; 20s. less for contracts.
Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.
Sodium Acetate 97/98%.—£24 per ton.
Sodium Bicarbonate.—£10 10s. per ton, carr. paid.
Sodium Bichromate.—4½d. per lb.
Sodium Bisulphite Powder 60/62%.—£17 to £18 per ton, according to quantity, f.o.b., 1-cwt. iron drums included.
Sodium Chlorate.—2½d. to 3½d. per lb.
Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.
Sodium Nitrite 100% basis.—£27 per ton d/d.
Sodium Sulphide conc. solid. 60/65.—About £15 per ton d/d. Contract £14 15s. Carr. pd.
Sodium Sulphide Crystals.—£9 5s. per ton d/d. Contract £9 2s. 6d. Carr. pd.
Sodium Sulphide, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—5½d. per lb. Slightly better demand. Crude 60's, 1s. 8d. to 1s. 9d. per gall. Market firmer.
Acid Cresylic 97/99.—1s. 10d. to 1s. 11d. per gall. Market rather dull. Pale, 95%, 1s. 7d. to 1s. 9d. per gall. Dark, 1s. 7d. per gall. Market dull.
Anthracene Paste 40%.—4d. per unit per cwt.—Nominal price. No business.
Anthracene Oil, Strained.—6½d. to 7½d. per gall. Unstrained, 6d. to 6½d. per gall.
Benzol.—Crude 65's.—9d. to 11½d. per gall., ex works in tank wagons. Standard Motor, 1s. 4½d. to 1s. 6d. per gall., ex works in tank wagons. Pure, 1s. 9½d. to 1s. 11d. per gall., ex works in tank wagons. Supplies very scarce.
Toluol,—90%, 1s. 7d. to 1s. 7½d. per gall. More inquiry. Pure, 1s. 11d. to 2s. per gall. Steady demand.
Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.
Creosote.—Cresylic, 20/24%, 8½d. to 9d. per gall. Better demand. Middle Oil, Heavy, Standard specification, 6d. to 7d. per gall., according to quality and district. Market firmer. Steady demand.
Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. 3d. to 1s. 7d. per gall. Demand good. Solvent 90/190, 11½d. to 1s. 1d. per gall. Steady business.
Naphthalene Crude.—Demand rather better. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £3 to £5 per ton. Demand rather better. Whizzed or hot pressed, £6 to £9 per ton.
Naphthalene.—Crystals and Flaked, £12 to £15 per ton, according to districts.
Pitch.—Medium soft, 47s. 6d. to 55s. per ton, according to district. Not much business.
Pyridine.—90/160, 18s. to 18s. 6d. per gall. Fair inquiries. Heavy, 11s. to 12s. Rather flat.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.
Acid H.—3s. 10d. per lb. 100% basis d/d.
Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.
Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.
Acid Salicylic, technical.—1s. 0½d. to 1s. 1d. per lb. Good demand.
Acid Sulphanilic.—9d. per lb. 100% basis d/d.
Aluminium Chloride, anhydrous.—10d. per lb. d/d.
Aniline Oil.—8d. per lb. naked at works.
Aniline Salts.—8d. per lb. naked at works
Antimony Pentachloride.—1s. per lb. d/d.
Benzidine Base.—3s. 9d. per lb. 100% basis d/d.
Benzyl Chloride 95%.—1s. 1d. per lb.
p-Chlorphenol.—4s. 3d. per lb. d/d.
p-Chloraniline.—3s. per lb. 100% basis.
o-Cresol 29/31° C.—3½d. to 4d. per lb. Poor demand.
m-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
p-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
Dichloraniline.—2s. 3d. per lb.
Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.
p-Dichlorbenzol.—£85 per ton.
Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.
Dimethylaniline.—2s. 2½d. per lb. d/d. Drums extra.
Dinitrobenzene.—9d. per lb. naked at works.
Dinitrochlorbenzol.—£84 10s. per ton d/d.
Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. 2d. per lb. naked at works.
Diphenylaniline.—2s. 10d. per lb. d/d.
G. Salt.—2s. 2d. per lb. 100% basis d/d.
Monochlorbenzol.—£63 per ton.
a-Naphthol.—2s. 4d. per lb. d/d.
B-Naphthol.—1s. per lb. d/d.
a-Naphthylamine.—1s. 3½d. per lb. d/d.
B-Naphthylamine.—4s. per lb. d/d.
m-Nitraniline.—4s. 2½d. per lb. d/d.
p-Nitraniline.—2s. 2½d. per lb. d/d.
Nitrobenzene.—5¼d. to 5½d. per lb. naked at works.
o-Nitrochlorbenzol.—2s. 3d. per lb. 100% basis d/d.
Nitronapthalene.—10d. per lb. d/d.
p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.
p-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.
m-Phenylene Diamine.—4s. per lb. d/d.
p-Phenylene Diamine.—10s. per lb. 100% basis d/d.
R. Salt.—2s. 4d. per lb. 100% basis d/d.
Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.
o-Toluidine.—10d. per lb.
p-Toluidine.—2s. 4d. per lb. naked at works.
m-Toluylene Diamine.—4s. per lb. d/d.

Wood Distillation Products

Market quiet, American competition still fairly keen.
Acetate of Lime.—Brown £11 to £11 5s. per ton d/d and upward. Quiet market. Grey, £15 to £15 10s. per ton. Firmer. Liquor, 9d. per gall. 32° Tw.
Charcoal.—£7 5s. to £9 per ton, according to grade and locality. Fair demand.
Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.
Red Liquor.—10d. to 1s. per gall. 14/15° Tw.
Wood Creosote.—2s. 9d. per gall. Unrefined.
Wood Naphtha, Miscible.—4s. 9d. per gall. 60% O.P. Solvent, 5s. per gall. 40% O.P.
Wood Tar.—£3 5s. to £4 per ton. Demand slack and stocks being held.
Brown Sugar of Lead.—£44 per ton. Steady market.

Rubber Chemicals

Antimony Sulphide.—Golden, 5¾d. to 1s. 4d. per lb., according to quality. Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.
Arsenic Sulphide, Yellow.—1s. 11d. per lb.
Barytes.—£3 10s. to £6 15s. per ton, according to quality.
Cadmium Sulphide.—3s. 9d. to 4s. 3d. per lb., according to quantity.
Carbon Bisulphide.—£30 to £33 per ton, according to quantity.
Carbon Black.—6d. to 6½d. per lb., ex wharf.
Carbon Tetrachloride.—£62 10s. to £67 10s. per ton, according to quantity drums extra.
Chromium Oxide, Green.—1s. 3d. per lb.
Indiarubber Substitutes, White and Dark.—5d. to 9½d. per lb. Demand very brisk. Prices likely to remain steady owing to firmness of rapeseed oils.
Lamp Black.—£48 per ton, barrels free.
Lead Hyposulphite.—7½d. per lb.
Lithopone, 30%.—£22 10s. per ton.

Mineral Rubber "Rubpron."—£16 5s. per ton f.o.r. London.
Sulphur.—£10 to £12 per ton, according to quality.
Sulphur Chloride.—4d. per lb., carboys extra.
Sulphur Precip. B.P.—£56 to £65 per ton.
Thiocarbanilide.—2s. 6d. per lb.
Vermilion, Pale or Deep.—5s 6d. per lb. Dearer.
Zinc Sulphide.—7½d. to 1s. 8d. per lb., according to quality.

Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£45 per ton ex wharf London in glass containers.
Acid, Acetyl Salicylic.—2s. 11d. to 3s. 1d. per lb., according to quantity. Sales steady. Price firm.
Acid, Benzoic B.P.—2s. 6d. per lb.
Acid, Boric B.P.—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 4½d. to 1s. 5d. per lb., less 5% for ton lots. Increased demand.
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in cwt. lots. Easier.
Acid, Pyrogallic, Crystals.—7s. per lb. for 1 cwt. lots. Resublimed quality 8s. per lb. Market firm.
Acid, Salicylic.—1s. 5½d. to 1s. 7d. per lb., according to quantity.
Acid, Tannic B.P.—2s. 9d. per lb. Quiet steady demand.
Acid, Tartaric.—1s. 1d. per lb., less 5%. Very firm, raw material again dearer.
Amidol.—9s. per lb., d/d.
Acetanilide.—1s. 10d. to 2s. per lb. More inquiry.
Amidopyrin.—15s. per lb. Firmer.
Ammonium Benzoate.—3s. to 3s. 6d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton.
Atropine Sulphate.—12s. 6d. per oz. for English make.
Barbitone.—13s. 9d. per lb.
Benzonaphthol.—5s. 3d. per lb. spot.
Bismuth Salts.—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
Bismuth Carbonate.—7s. 8d. to 9s. 8d. per lb.
Bismuth Citrate.—8s. to 10s. per lb.
Bismuth Salicylate.—7s. 5d. to 9s. 5d. per lb.
Bismuth Subnitrate.—6s. 10d. to 8s. 10d. per lb. according to quantity. Market less firm, uncertain.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 10d. per lb., easier; sodium, 1s. 11d. per lb., easier; ammonium, 2s. 3d. to 2s. 4d. per lb. Firmer.
Calcium Lactate.—1s. 7d. to 2s., according to quantity. Fair demand and steady market.
Chloral Hydrate.—4s. per lb.
Chloroform.—2s. 6d. per lb. for cwt. lots.
Creosote Carbonate.—6s. 6d. per lb. Little demand.
Formaldehyde.—£48 to £49 per ton, in barrels ex wharf London. Supplies exceed demand.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
Guaiacol Carbonate.—9s. 3d. per lb. Firmer.
Hexamine.—3s. per lb. For bold crystal. Powder slightly less.
Homatropine Hydrobromide.—25s. to 30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s per oz.
Hydroquinone.—4s. 3d. per lb. in cwt. lots. Foreign make.
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—1s. 11d. to 2s. 3d. per lb.
Magnesium Carbonate.—Light Commercial, £36 per ton net. Light pure, £46 per ton.
Magnesium Oxide.—Light Commercial, £75 per ton, less 2½%; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity. Steady market.
Menthol.—A.B.R. recrystallised B.P., 50s. per lb., February delivery; Synthetic, 26s. to 35s. per lb. according to quality. English make. Increasing demand.
Mercurials.—Market very quiet. Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 5d. to 3s. 7d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb.
Methyl Salicylate.—1s. 9d. to 1s. 11d. per lb.
Methyl Sulphonel.—21s. per lb.
Metol.—11s. per lb. British make.
Morphine and Salts.—Reduced by 1s. to 1s. 3d. per oz.
Paraformaldehyde.—2s. 8d. for B.P. quality.
Paraldehyde.—1s. 2d. to 1s. 6d. per lb., in free bottles and cases.
Phenacetin.—5s. 3d. per lb. in cwt. lots.
Phenazone.—6s. 8d. per lb.
Phenolphthalein.—5s. per lb. for cwt. lots.
Potassium Bitartrate 99/100% (Cream of Tartar).—86s. per cwt., less 2½% for ton lots. Raw material again dearer.
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb.
Potassium Ferricyanide.—1s. 9d. per lb. Quiet.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity Steady market.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., carriage paid; commercial, 8d. to 8½d. per lb., carriage paid. Forward prices higher.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
Resorcin.—5s. per lb. In fair quantities. Supplies exceed demand.
Saccharin.—63s. per lb. in 50-lb. lots.
Salol.—3s. 6d. per lb., for cwt. lots. Slightly dearer.
Silver Proteinate.—9s. per lb. for satisfactory product light in colour.
Sodium Benzoate, B.P.—1s. 10d. to 2s. per lb. From natural benzoic acid. Supplies of good quality available.
Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.
Sodium Hypophosphite, Photographic.—£13 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb.
Sodium Potassium Tartrate (Rochelle Salt).—75s. per cwt., for ton lots and upwards.
Sodium Salicylate. Powder, 2s. 3d. to 2s. 5d. per lb. Crystal, 2s. 4d. to 2s. 6d. per lb. Flake, 2s. 6d. per lb. Strong demand, market firmer. Prices advancing.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.
Sodium Sulphite, anhydrous, £27 10s. per ton, minimum 5 ton lots, according to quantity; 1 cwt. kegs included.
Sulphonal.—14s. 6d. per lb. Little demand.
Thymol.—17s. per lb.

Perfumery Chemicals

Acetophenone.—11s. per lb.
Aubepine.—12s. 6d. per lb.
Amyl Acetate.—3s. per lb.
Amyl Butyrate.—6s. 6d. per lb.
Amyl Salicylate.—3s. 3d. per lb.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 9d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 9d. per lb.
Benzaldehyde free from Chlorine.—2s. 9d. per lb.
Benzyl Benzoate.—3s. 6d. per lb.
Cinnamic Aldehyde Natural.—18s. 6d. per lb.
Coumarin.—17s. per lb.
Citronellol.—20s. per lb.
Citral.—9s. per lb.
Ethyl Cinnamate.—12s. 6d. per lb.
Ethyl Phthalate.—3s. per lb.
Eugenol.—10s. 6d. per lb.
Geraniol. (Palmarosa).—31s. 6d. per lb. Cheaper.
Geraniol.—12s. 6d. to 20s. per lb.
Heliotropine.—6s. 9d. per lb.
Iso Eugenol.—16s. per lb.
Linalol ex Bois de Rose.—26s. per lb.
Linalyl Acetate.—26s. per lb.
Methyl Anthranilate.—10s. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ambrette.—50s. per lb.
Musk Ketone.—42s. 6d. per lb.
Musk Xylol.—14s. per lb.
Nerolin.—4s. 6d. per lb.
Phenyl Ethyl Acetate.—15s. 6d. per lb.
Phenyl Ethyl Alcohol.—14s. 3d. per lb. Cheaper.
Rhodinol.—50s. per lb.
Safrol.—1s. 10d. per lb.
Terpineol.—2s. 4d. per lb.
Vanillin.—25s. to 25s. 6d. per lb.

Essential Oils

Almond Oil, Foreign S.P.A.—15s. 6d. per lb.
Anise Oil.—2s. 10d. per lb.
Bergamot Oil.—14s. 9d. per lb.
Bourbon Geranium Oil.—29s. per lb. Cheaper.
Camphor Oil.—65s. per cwt.
Cananga Oil, Java.—11s. 3d. per lb.
Cinnamon Oil, Leaf.—6½d. per oz.
Cassia Oil, 80/85%.—9s. per lb.
Citronella Oil.—Java, 85/90%, 6s. per lb. Again cheaper. Ceylon, 3s. 3d. to 3s. 6d. per lb., according to quality.
Clove Oil.—7s. 9d. per lb. Cheaper.
Eucalyptus Oil, 70/75%.—2s. 1d. per lb.
Lavender Oil.—French 38/40% Esters, 35s. per lb.
Lemon Oil.—3s. 4d. per lb.
Lemongrass Oil.—5s. 9d. per lb.
Orange Oil, Sweet.—10s. 9d. per lb.
Otto of Rose Oil.—Bulgarian, 42s. 6d. per oz. Anatolian, 28s. per oz.
Palma Rosa Oil.—16s. 9d. per lb.
Peppermint Oil.—Wayne County, 45s. per lb. Japanese, 22s. 6d. per lb.
Petitgrain Oil.—9s. 9d. per lb.
Sandal Wood Oil.—Mysore, 26s. 7d. per lb. Australian, 18s. 6d. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, January 22, 1925.

THERE is little of importance to record in the Heavy Chemical Market during the past week, prices, with one or two exceptions, notably carbonate of potash, being unchanged. Inquiry both for Home and Export has been moderately good.

Industrial Chemicals

ACID ACETIC.—In little demand, but prices unchanged, as follows :—Glacial 98/100%, £57 to £68 per ton, according to quality and packing; 80% pure, quoted £43 to £45 per ton; 80% technical, £42 to £44 per ton, packed in casks, delivered c.i.f. U.K. port, duty free.

ACID BORACIC.—Remains unchanged. Crystal or granulated, £45 per ton; powdered, £47 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—In good demand and price unchanged at about 5¾d. per lb., delivered.

ACID CITRIC, B.P. CRYSTALS.—Quoted 1s. 4½d. per lb., less 5% ex store, demand rather poor.

ACID FORMIC, 85%.—In moderate demand, and price about £52 per ton, ex store, spot delivery. Offered from the continent at about £51 per ton, c.i.f. U.K. port.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—In moderate demand, and price unchanged at about 3¾d. per lb., ex store. Offered for prompt shipment from the continent at 3½d. per lb., ex wharf.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton, 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Unchanged at about 11¾d. per lb., less 5% ex store. Offered for forward delivery at about the same figure.

ALUMINA SULPHATE, 17/18% IRON FREE.—Quoted £6 10s. per ton, c.i.f. U.K. port, prompt shipment. Spot lots about £7 7s. 6d. per ton, ex store.

ALUM.—Lump potash alum unchanged at about £9 15s. per ton, ex store, spot delivery. Offered from the continent at about £8 15s. per ton, ex wharf. Ammonium chrome alum of British manufacture, quoted £17 per ton, f.o.b. U.K. port.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 6d. per lb., ex station. Containers extra and returnable, with possible slight reduction for large quantities.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5-cwt. casks, delivered U.K. port.

AMMONIA LIQUID, 880°.—In steady demand. Unchanged at 2½d. to 3d. per lb., delivered, according to quantity, containers extra.

AMMONIA MURIATE.—Grey galvanisers' crystals of English manufacture quoted £30 per ton, ex station, packed in casks. Bags, £1 per ton less. Fine white crystals offered from the continent at about £23 per ton, c.i.f. U.K. port.

ARSENIC, WHITE POWDERED.—Spot lots unchanged at about £36 per ton, ex store. Offered for early delivery at slightly less.

BARIUM CARBONATE, 98/100%.—Offered from the continent at about £9 10s. per ton, c.i.f. U.K. port.

BARIUM CHLORIDE, 98/100%.—Fine white crystals offered from the continent at about £9 10s. per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots quoted £10 10s. per ton, ex station. Contracts, 20s. per ton less.

BARYTES.—English material, unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. port.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Rather cheaper quotations from the continent. Now offered at £4 7s. 6d. per ton, c.i.f. U.K. port.

COPPERAS, GREEN.—Unchanged at about £3 5s. per ton, ex works, packed in casks, free.

COPPER SULPHATE.—British material for export quoted about £24 per ton, f.o.b. U.K. port. Continental available on spot at about £23 10s. per ton, ex store.

FORMALDEHYDE 40%.—Quoted £43 to £44 per ton, c.i.f. U.K. port.

GLAUBER SALTS.—White crystals of English manufacture, unchanged at £4 per ton, ex store or station. Fine white crystals offered from the continent at £3 5s. per ton, c.i.f. U.K. port.

LEAD, RED.—Imported material, unchanged at about £48 per ton, ex store.

LEAD, WHITE.—Unchanged at about £48 15s. per ton, ex store.

LEAD ACETATE.—Spot lots quoted £48 per ton, ex store. Offered for forward delivery at about the same figure.

MAGNESITE, CALCINED.—Unchanged at about £7 17s. 6d. per ton, ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton, ex station. Finer quality of continental manufacture, quoted £7 15s. per ton, c.i.f. U.K. port.

MAGNESIUM.—Unchanged at about £4 15s. per ton, c.i.f. U.K. port. prompt shipment.

POTASH, CAUSTIC.—88/92%, unchanged at about £31 per ton, ex wharf, prompt shipment from the continent.

POTASSIUM BICHROMATE.—Quoted 5d. per lb. delivered.

POTASSIUM CARBONATE 96/98%.—A further advance in continental prices. Now quoted about £23 10s. per ton, c.i.f. U.K. port. Spot material available at about £25 per ton, ex store.

POTASSIUM CHLORATE.—Quoted 2¾d. per lb., c.i.f. U.K. port, prompt shipment. Spot lots available at about 2⅞d. per lb., ex wharf.

POTASSIUM NITRATE. SALTPETRE.—Quoted £26 per ton, c.i.f. U.K. port, prompt shipment from the continent. Spot lots on offer at £28 15s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Spot material now quoted 8¾d. per lb., ex store. Offered from the continent at a fraction less.

POTASSIUM PRUSSIATE, YELLOW.—Offered for early delivery at 7½d. per lb., ex wharf. Spot material now quoted 7¾d. per lb., ex store.

SODA CAUSTIC.—76/77%, £18 per ton; 70/72%, £16 2s. 6d. per ton; broken, 60%, £17 2s. 6d. per ton; powdered, 98/99%, £21 7s. 6d. per ton, all carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—White crystals offered from the continent at £20 per ton, c.i.f. U.K. port. Spot material available at about £22 15s. per ton, ex store.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Quoted 4d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Powdered or pea quality, £1 7s. 6d. per ton more. Alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material unchanged at £10 per ton, ex station. Continental quoted £8 5s. per ton, c.i.f. U.K. port. Spot lots available at about £9 10s. per ton, ex store. Pea crystals of English manufacture quoted £13 15s. per ton, ex station.

SODIUM NITRATE.—Ordinary quality quoted £13 17s. 6d. per ton, ex store; 96/98%, refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Rather better inquiry. Price £27 per ton, ex station, basis 100%.

SODIUM PRUSSIATE, YELLOW.—Moderate inquiry and price unchanged at about 4½d. per lb., ex store.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton, f.o.r. works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—English manufacturers quoted 60/65% solid, £15 per ton; broken, £1 per ton more; flake, £2 per ton more; crystals, 31/34%, £9 5s. per ton, carriage paid U.K. stations. Minimum four ton lots with slight reduction for contracts over a period. Solid, 60/62%, offered from the continent at about £12 per ton, c.i.f. U.K. port; 30/32% crystals at about £8 10s. per ton, c.i.f. U.K. port.

SULPHUR.—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton, ex store. Prices nominal.

ZINC CHLORIDE.—96/98% of continental manufacture quoted £23 per ton, c.i.f. U.K. port. English material for export on offer at about £25 to £26 per ton, f.o.b. U.K. port.

ZINC SULPHATE.—Unchanged at £12 15s. per ton, ex store, spot delivery.

NOTE.—The above prices are for bulk business and are not to taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHTHA NAPHTHOL.—Some home inquiry, 2s. 3d. per lb. delivered.

AMIDO SALICYLIC ACID.—Some export inquiry, 8s. 5d. per lb., 100% basis, f.o.b.

ALPHA NAPHTHYLAMINE.—Some export inquiry, 1s. 3d. per lb., f.o.b.

NAPHTHIONIC ACID.—Export inquiry, 2s. per lb., 100% basis, f.o.b.

BENZIDINE BASE.—Good export inquiry, 3s. 8d. per lb., 100% basis, f.o.b.

BENZALDEHYDE.—Some export inquiry, 2s. 2¾d. per lb., f.o.b., drums included.

BETA NAPHTHYLAMINE.—Some export inquiry, 3s. 9d. per lb., f.o.b.

CHROMOTROPIC ACID.—Small home inquiry, 6s. 4d. per lb., 100% basis, carriage paid.
DIMETHYLANILINE.—Small home inquiry, 2s. 2d. per lb., delivered.
FREUND ACID.—4s. 10d½. per lb., 100% basis, f.o.b.
GAMMA ACID.—Some export inquiry, 10s. per lb., 100% basis, f.o.b.
H ACID.—Good export inquiry, 3s. 6d. per lb., 100% basis, f.o.b.
META PHENYLENE DIAMINE.—Some export inquiry, 4s. per lb., f.o.b.
METANILIC ACID.—Moderate export demand, 2s. 9d. per lb., 100% basis, f.o.b.
META XYLIDINE.—Good export inquiry, 7s. per lb., f.o.b.
META NITRANILINE.—Some export inquiry, 3s. 8d. per lb., f.o.b.
NEVILLE WINTHER ACID.—Some export inquiry, 5s. 8d. per lb., 100% basis, f.o.b.
NITRO BENZOL.—Small export inquiry, 6½d. per lb., f.o.b., drums included.
NAPHTHIONATE OF SODA.—Export inquiry, 2s. 2d. per lb., 100% basis, f.o.b.
ORTHO TOLUIDINE.—Good export inquiry, 6½d. per lb., f.o.b., drums included.
PARANITRANILINE ORTHO SULPHONIC ACID.—Some home inquiry, 4s. 6d. per lb., 100% basis d/d.
PARA PHENYLENE DIAMINE.—Export inquiry, 9s. 9d. per lb., 100% basis, f.o.b.
S. ACID.—Export inquiry, 12s. 1d. per lb., 100% basis, f.o.b.
TOLUIDINE.—Export inquiry, 1s. 6d. per lb., f.o.b., drums included.
SULPHONILIC ACID.—Some export inquiry, 9d. per lb., 100% basis, f.o.b.
XYLIDINE.—Some export inquiry, 2s. 1d. per lb., drums included, f.o.b.

The German Chemical Market

[FROM A HAMBURG CORRESPONDENT.]

THE expected revival of business has not materialised chiefly because foreign clients have held back their orders to see how the commercial treaty negotiations would end. On account of the strengthening of metal prices, quotations for several articles have risen considerably, such as copper sulphate which reached £22 10s., and on the other hand zinc white could be stabilised at £39. As quotations of zinc run on about the same level with the finished article, a further rise may be expected.

Most probably the question of capital will remain for some time to come a critical point. Almost without exception foreign clients demand credits and usually until goods have reached their destination. Even greater claims going as far as three months are made and only in very few cases is the exporter in a position to fulfil the requests of foreign customers, for on the one side German furnishers will not meet him, and on the other hand the foreign buyers will not be induced to give the absolutely necessary guarantees.

Demands for oxalic acid were more lively during the last few days, no doubt because the United States are about to raise the import duty considerably. There was also an increased demand in acid tartaric and citric acid. Greater transactions were made in potash and prices were granted on the basis of $10.30 f.o.b. Hamburg. Caustic potash was further stabilised as the quantity available in free trade cannot be great and quotations are about $14.50.

Important Grinding Mill Orders

THE London office of the Hardinge Company reports that an order has been received from Cronfestu, Belgium, for a 10 ft. dia. by 48 in. cyl. Hardinge conical ball mill and a 14 ft. dia. Gayco centrifugal separator. This will form a 10-ton an hour unit for grinding cement clinker to finished cement. This 10 ft. Hardinge mill is the largest diameter ball mill built, and it has been demonstrated in practice in America that this large diameter increases grinding efficiency in relation to tons per horse-power ground. The approximate weight of the mill complete with grinding charge is 70 tons, the bearings are 33 in. in diameter, self-aligning and water-cooled, trunnions are of cast steel driven by machine-cut steel spur gearing, a 350 h.p. motor will drive the mill, and a 15 h.p. motor will drive the Gayco separator.

An order has also been received for the latest type and design of an 8 ft. Hardinge pebble mill, with 23 in. dia. trunnions, machine-cut steel gearing, and a 14 ft. Gayco centrifugal separator for grinding talc to no residue on 200 mesh. A 6 ft. dia. by 22 in. cyl. Hardinge ball mill has also been ordered for grinding slag in England.

In the mining section, orders have been received from the Villemagne Co. for three 5 ft. dia. Hardinge mills of latest and improved design, equipped with 23 in. dia. trunnions, for France. The Bwana M'Kubwa Co. has ordered two 8 ft. type, 39 heavy duty hum-mer screens for screening copper ore in Africa.

Brunner, Mond and Co.'s Activities.

Sir John Brunner on Output

PRESIDING at the annual meeting of the Winnington Park Recreation Club, Sir John Brunner, Bart., said that the athletic side of the activities of Brunner, Mond and Co. were flourishing, and the business of the company was also flourishing. One, he supposed, depended to a large extent upon the other. The firm was now on full make, for the reason that they wanted to get stocks in before their new works at Wallerscote were started. If a boom came in trade they would find that their stocks would disappear before the Wallerscote works were ready; but those works would, they calculated, be ready for any boom that might come. It was a works which was absolutely up to date in every respect, and they would at those new works turn out, he believed, the cheapest soda ash in the world.

The firm's other activities in the far North were working very successfully and they were turning out something like 120 tons of sulphate of ammonia every day, and making the agriculture of the world more able to rely upon fertilisers than it had been in the past. He believed they were now the largest makers of sulphate of ammonia in the world, and he wanted those interested in agriculture to appreciate the fact that sulphate of ammonia was the very best thing they could put upon the land, and that if they would spend money upon such an article it would return them manifold crops. They hoped that the time was coming when the farmers of this country would realise that by buying such fertilisers they would restore some visible prosperity to agriculture.

Sir John added that the firm intended to extend the recreative and athletic activities of the workers at their various Cheshire works in a marked degree, and under the able superintendence of Mr. Max Woosnam everybody was now able to engage in some form of recreation which he would enjoy.

Chile's Nitrate Industry

A Land of Great Possibilities

AT a meeting of the Birmingham Natural History and Philosophical Society on Tuesday, a lecture on "Chile and its Nitrate Fields" was given by Mr. R. F. Fuller.

The lecturer said Chile was the only country in the world producing natural nitrate, and was the second largest producer of copper, and might easily become the first if her resources were more fully developed. In addition to these minerals Chile produced gold, silver, lead, borates, coal, cobalt, and iodine in large quantities. Chile derived by far the greatest portion of its revenue from the nitrate fields. This industry, which started in a very small way a comparatively short time ago, had become by far the most important in the country, and now produced an annual revenue of about £12,000,000. To this must be added the export duties on the nitrate and import duties on machinery, coal and fuel oil used in the industry, which probably brought up the revenue from this one source alone to about £15,000,000.

The output of nitrates was governed by the Nitrate Producers' Association which decided how much nitrate each factory should produce during the year, and no company was allowed to manufacture more than its allotted quota. The Government held large tracts of nitrate-bearing lands which had not yet been worked and which were being held in reserve.

Chile was a progressive, well governed, law-abiding country, which offered splendid opportunities to young men who were prepared to learn Spanish and to work hard, while the climate in the more northerly parts on the lower slopes of the Andes was delightful and wonderfully healthy, and life on the nitrate fields was full of interest.

Company News

MIAMI COPPER CO.—A dividend of $\$\frac{1}{2}$ per share for the last quarter is announced, payable on February 16.

BENZOL AND BY-PRODUCTS, LTD.—The transfer books of the company will be closed from January 23 to February 3, both days inclusive, for the preparation of preference and ordinary dividend warrants.

ELLIOTT'S METAL CO., LTD.—The directors have declared interim dividends of $2\frac{1}{2}$ per cent. on the preference shares for six months, and 1s. per share on the ordinary shares, both less tax, payable on February 1.

CELLULOSE HOLDINGS AND INVESTMENT CO., LTD.—The directors have decided to distribute to the holders of the 7 per cent. participating first mortgage debenture stock 17s. 3d. per cent. (free of tax) in respect of their participation in profits to December 31 last, payable on February 2.

CHLORIDE ELECTRICAL STORAGE CO., LTD.—The directors have resolved to capitalise part of the reserves and offer to the ordinary shareholders one new ordinary share for every two shares held. The issued ordinary share capital of the company is £219,750 in £1 shares, of which 73,250 were issued as a bonus, share for share, in 1917, and a similar number, in the proportion of one share for every two held, in 1920, out of the reserve fund. With the present proposal, therefore, the capital bonus issues amount to 350 per cent. on the original capital.

AMALGAMATED ZINC (DE BAVAY'S).—The report for the half-year ended June 30, 1924, presented to the half-yearly meeting held in Melbourne on November 20 last, shows that, after transferring £3,030 to reserve for depreciation, the gross profit on working account amounted to £12,462. Adding interest earned, etc., the net profit transferred to appropriation account was £32,195. Adding £23,500 transferred from equalisation reserve and including £10,814 brought forward, made total available of £66,509, out of which £41,439 has been utilised for depreciation of property, patents, processes, and shares account, leaving £25,070 carried forward. Since the close of the half-year dividend of 1s. per share was paid on October 15, 1924.

Tariff Changes

GRENADA.—An Order imposes the following export duties—on whale oil (on every 40-gall. barrel of the first 4,000 barrels exported in the year by a company), 1s. 3d. per barrel—excess barrels, 2s. 6d. each. On every bag of 200 lb. of whale guano 1s. is charged.

AUSTRIA.—The Treaty between Germany and Austria has resulted in general reductions of import duties and the new charges are applicable to similar goods of U.K. origin imported into Austria. New charges (in gold kronen per 100 kilogs.) include boric acid, refined, 7; nitric acid, 2; *leunasalpeter*, for fertilising purposes, 1; permanganate of potash, 16; chlorate of potash, 10; chrome alum, 6; sulphate of alumina, 4·50; zinc sulphate, 3·50; liquid chlorine, free; formaldehyde and paraformaldehyde, 24; aniline oil, aniline salt, 3·60; colours and paints prepared for retail sale, 70.

CHINA.—H.M. Minister at Pekin reports that the use of white phosphorus in the manufacture of matches in China and the import of white phosphorus into China are prohibited. The sale of white phosphorus is to be forbidden as from July 1, 1925.

GERMANY.—The Treaty with Austria results in the following alterations in import duties, which are applicable to U.K. goods (in marks (gold) per 100 kilogs.) :—Graphite, crude (in lumps), ground or washed, free; magnesite, calcined or not, free; gypsum (sulphate of lime), even calcined, ground or washed, free; Portland cement, Roman cement, puzzolana cement, magnesia cement, slag cement and the like, with or without addition of colouring materials or other materials ground or crushed, 1; talc, crude, also ground or calcined, free; peroxide of hydrogen, 1; chloride of mercury (sublimate), free; artificial resin, 24; chemically prepared wood pulp (cellulose), 2·50.

ROUMANIA.—Export duties fixed include starch, dextrine, etc., 5,000 lei per wagon.

SWITZERLAND.—The Decree authorising import restrictions has been extended to March 31, 1926.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to February 21, 1925.

"NYLOX."

453,921. For anti-corrosives. The Power Chemical Company, Blyth Nook, Pandon, Newcastle-on-Tyne; engineering chemists. November 25, 1924.

"MURATON."

454,063. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Class 1. Johnson Brothers., Ltd., Cleveland Works, Wincolmlee Street, Sculcoates, Hull; manufacturers. November 28, 1924.

"ROUTEPHALTE."

454,680. For a mixture of tar and bitumen for use in making roads. Burt, Boulton and Haywood, Ltd., Salisbury House, London Wall, London, E.C.2; merchants and manufacturers. December 19, 1924.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

CHEMICALS, ETC.—The Chilian State Railways has issued a series of booklets stating their requirements of chemical products, disinfectants, paints, varnishes, acetylene lighting materials, etc. Calls for tenders are expected shortly. (Reference, C. 1387.)

CHEMICALS, ETC.—A wholesale merchant and commission agent established at Eindhoven wishes to represent British manufacturers of chemical and electro-technical articles; caustic soda, solid, and in lumps, and other heavy chemicals (excepting red lead, white lead, and litharge). Correspondence may be in English. (Ref. No. 104.)

PAINT.—A firm in Havana (Cuba) is desirous of getting into touch with British manufacturers and exporters of paints. (Ref. No. 117.)

TAR FOR ROAD-SPRAYING.—About 30,000 galls. of distilled tar for use in tar-spraying roads are required by Bexhill Town Council. The tar, which must comply with the Ministry of Transport (Roads Department) specification for tar No. 1, to be delivered in barrels, carriage paid, to Bexhill or Sidley Stations, Southern Railway, S.E. section, as required. The prices quoted must include the cost of returning empties. Forms of tender from Mr. G. Ball, Town Hall. Tenders to Mr. S. J. Taylor, Town Hall, by February 6.

Chemical Research in Canada

MR. JOHN A. DRESSER, president of the Montreal Section of the Society of Chemical Industry, at a recent dinner reviewed the field for chemical research in Canada, and touched upon the various applications of the science to industry. He claimed that too much raw material was exported from Canada and far too many finished goods were imported. It was preposterous to dream of the expansion of Canadian business on such a basis. Tariffs must be raised, and raised high, so that Canada's basic wealth could be converted into utilities in the Dominion, and then sold there.

During a discussion, it was pointed out that the problem was really one of economics. Canada's non-metallic minerals were of more necessity than gold: this applied especially to clays, which were of incalculable value to manufactures. It was also contended that the Government, by raising tariffs, would promote a saner immigration policy. It was the opinion of many speakers that chemists had a great part to play in the future industrial development of Canada, but at present they were severely handicapped by Government regulations.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

PALMER, HENRY DEANE (trading as DIRECT CHEMICAL AND ANILINE PRODUCT CO.), 403, Walworth Road, Walworth, chemical dealers. (C.C., 24/1/25.) £37 7s. 4d. November 24.

UNITED OIL REFINERS COMBINE, Oldham, oil refiners. (C.C., 24/1/25.) £12 18s. 6d. December 6.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

ACME CHEMICAL CO., LTD., Tonbridge. (M., 24/1/25.) Registered January 10, £300 debentures; general charge (subject to prior charge). *£2,000. April 8, 1924.

EVANS, GADD AND CO., LTD., Exeter, chemists, etc. (M., 24/1/25.) Registered January 13 (by order on terms), £2,700 mortgage dated August 20, 1924, to Miss M. S. Francis, The Rectory, Bridestowe; charged on 23 and 24, Redcliff Street, Bristol. *£14,700. January 5, 1925.

LARNE SALT AND ALKALI CO., LTD., London, E.C. (M., 24/1/25.) Registered January 13, £15,000 debentures; general charge. *£1,600. August 21, 1924.

Satisfaction

BRITISH CYANIDES CO., LTD., London, E.C. (M.S., 24/1/25.) Satisfaction registered January 14, all moneys, etc., registered August 6, 1923.

Company Winding Up Voluntarily

UNITED SOAP COMPANY, LTD. (C.W.U.V., 24/1/25.) S. J. Crouch, 8, Lloyd's Avenue, London, E.C.3, appointed liquidator, January 9.

New Companies Registered

W. H. DALE AND CO., LTD. Tar distillers, manufacturers of tar by-products, oils, greases, paints, varnishes, disinfectants, sheep dips, etc. Nominal capital, £5,000 in £1 shares (3,000 7 per cent. cumulative preference and 2,000 ordinary). Solicitor: W. G. French, 20, North John Street, Liverpool.

HOLDERS, LONDON (1925), LTD. Soap manufacturers, manufacturers, refiners and preparers of and dealers in oils, oleaginous and saponaceous substances, unguents and ingredients, etc. Nominal capital, £3,000 in £1 shares (1,000 8 per cent. cumulative preference and 2,000 ordinary). Solicitors: Joynson Hicks and Co., Lennox House, Norfolk Street, London.

PETER SMAIL AND CO., LTD., 101, Leadenhall Street, London, E.C. Dealers in paints, colours, pigments, enamels, varnishes, oils, cements and all mineral and vegetable products, etc. Nominal capital, £5,000 in £1 shares.

STOKES AND DALTON, LTD., 38, Victoria Roadl Holbeck, Leeds. Manufacturing, wholesale and retai, chemists, druggists, oil and colourmen, etc. Nominal capital, £3,000 in £1 shares.

Magadi Soda Co.

A Question of the Debenture Holders' Trustees

IN the Chancery Division on Monday, Mr. Justice Eve had again before him the scheme of arrangement between the Magadi Soda Co., Ltd., and the several classes of its share and debenture holders.

Mr. Gavin Simonds, K.C., for the Official Receiver, the liquidator, said his lordship had made an order sanctioning the scheme, but leaving open the point who should be the trustees for the new debenture holders.

Mr. Bennett, for the debenture holders, said the matter was adjourned in order that the proposed trustees might have an opportunity of dealing with the suggestions that the trustees refused to give to one of the debenture holders information of what was going on in connection with the reconstruction and were buying debentures cheaply in the market. The trustees had evidence which completely disposed of that suggestion. Mr. Bennett said that there was a very large block of debentures which were being offered for sale by the London and Westminster Bank on October 17, 1923. They gave instructions to their brokers, and they tried to find purchasers for the block of shares, both in the market and privately, but failed. They then went to the trustees and saw their manager and asked him whether he could find somebody who would buy the debentures.

To Save the Market

In these circumstances the manager went to his directors and shareholders, who were a large number of industrial investment companies holding debentures in the Magadi Soda Co. They reluctantly, and in order to prevent the market being depressed with this large block being thrown on it, and to prevent the negotiations for the reconstruction which was pending being interfered with, arranged that this block of debentures should be split up among a large number of trust companies. The facts relating to that were sworn to at the beginning of January, and Mr. Pennell had notice of them on January 6, but only on Saturday last his clients receivde notice from Mr. Pennell that he was going to swear an affidavit, and he (counsel) had been handed that morning an affidavit of 29 paragraphs, which he had hardly had time to read.

Mr. Pennell said he did not know then that the matter was coming up that day, and he had difficult inquiries to make.

His Lordship, in the circumstances, adjourned the hearing until January 26.

A Chemist's Gas Mask Claim

A CLAIM in respect of box respirators was made by Mr. J. W. Clarke, chemist, of Soho Road, Handsworth, Birmingham, before the Royal Commission on Awards to Inventors in London on Monday.

Mr. Kenneth Wood, for the claimant, said that Mr. Clarke based his claims on two inventions, one with regard to the rubber-faced fabric of the box respirators, and the other for a solution which made it possible to repair torn masks and make them fit for use. In 1916, counsel said, masks were being rejected at the rate of sometimes 90 per cent. Many of the masks passed in England were rejected when they reached France. The defective masks had been torn in the course of production, and Mr. Clarke, after making experiments, produced a new design of mask to which the admission of gas was entirely prevented. This was the only design which passed the departmental tests. It was stated that during the war about 3,580,000 masks were repaired. The claimant had 100,000 through his hands at Schneider's factory, and every drop of a solution, which was impervious to gas and rendered a defective mask repairable, was made by claimant personally.

Mr. Clarke, giving evidence, said that he carried out his experiments outside and in addition to his military duties. A firm of Army contractors had offered to buy the formula for the solution, and he could have made a good thing out of it.

The hearing was adjourned until Monday, January 26.

Recent Will

Mr. Fred. Boehm, of Sudbury House, Harrow-on-the-Hill, managing director of Frederick Boehm, Ltd., London. £21,281